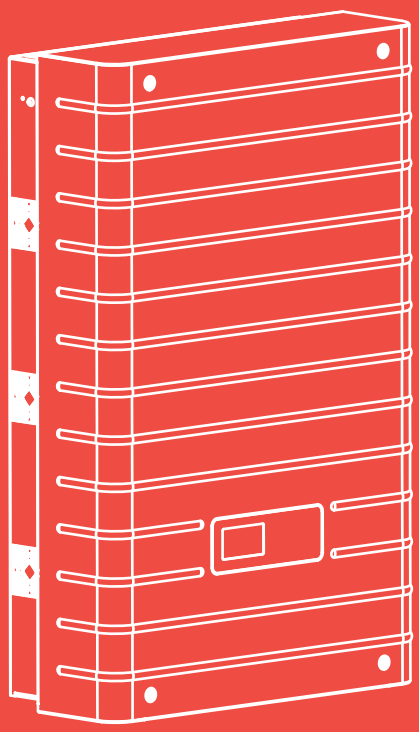
MANUAL



User Manual
Sunways Solar Inverter

NT 10000, NT 11000, NT 12000

English

EN

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Photovoltaic Technology

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Introduction

Thank you for purchasing an NT series Solar Inverter from Sunways, an innovative, high-quality product with unique features and consistently high efficiency.

This Solar Inverter is equipped with HERIC®topology and enables operation with a large number of solar modules and – as accustomed from Sunways – without the use of a transformer.

This user manual contains instructions for using the Sunways Solar Inverter and explains its functionality. Information is provided on safety, installation, commissioning, operation and system monitoring.

Please follow the safety instructions carefully to ensure increased safety at the operating site of the Solar Inverter.

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1 Product description

1.1 Intended use

The Sunways NT Solar Inverter is the link between your solar generator and the public power grid. The energy from the connected solar generator is converted to grid-compliant AC current and fed into the grid.

Solar modules which require earthing of the negative or positive terminal cannot be operated with the NT Solar Inverter. If in doubt, always ask your module manufacturer about a release!

1.2 Functional description

Conversion from direct into alternating current

The NT Solar Inverter converts the direct current produced by the solar generator into alternating current. The alternating current is then fed into the public power grid as a three-phase current.

Operating and display elements

Various interfaces are available for system configuration and monitoring:

- Control panel (LCD display and keyboard) for displaying operating and status values or for inputting system parameters
- Operating LED
- Integrated web server for display and configuration via a web browser

Interfaces

- Bus interface for connecting an analogue modem, ISDN modem or GSM/ GPRS modem
- Ethernet interface for connecting a PC or for integration in existing networks
- CAN bus interface for interconnecting several Solar Inverters
- S0 pulse output for controlling large displays
- Alarm relay for realising simple monitoring locally
- Interface for connecting an irradiance and temperature sensor

Data logging

The NT Solar Inverter offers internal data logging for recording and saving system data:

- 5-minute mean values of voltages, currents, output, temperature and irradiance (if sensor is installed)
- 5-minute, daily, monthly and annual energy yield values
- 5-minute maximum and minimum values for AC output, irradiance, system output
- Memory for malfunction messages

Grid monitoring

The NT Solar Inverter assumes the task of grid monitoring for the protection of the unit and persons. In case of abnormal grid conditions, feeding is immediately interrupted and the Solar Inverter disconnects from the grid by triggering the grid relay.

Functions resulting from the German Renewable Energy Act and the Medium- and Low-Voltage Directive

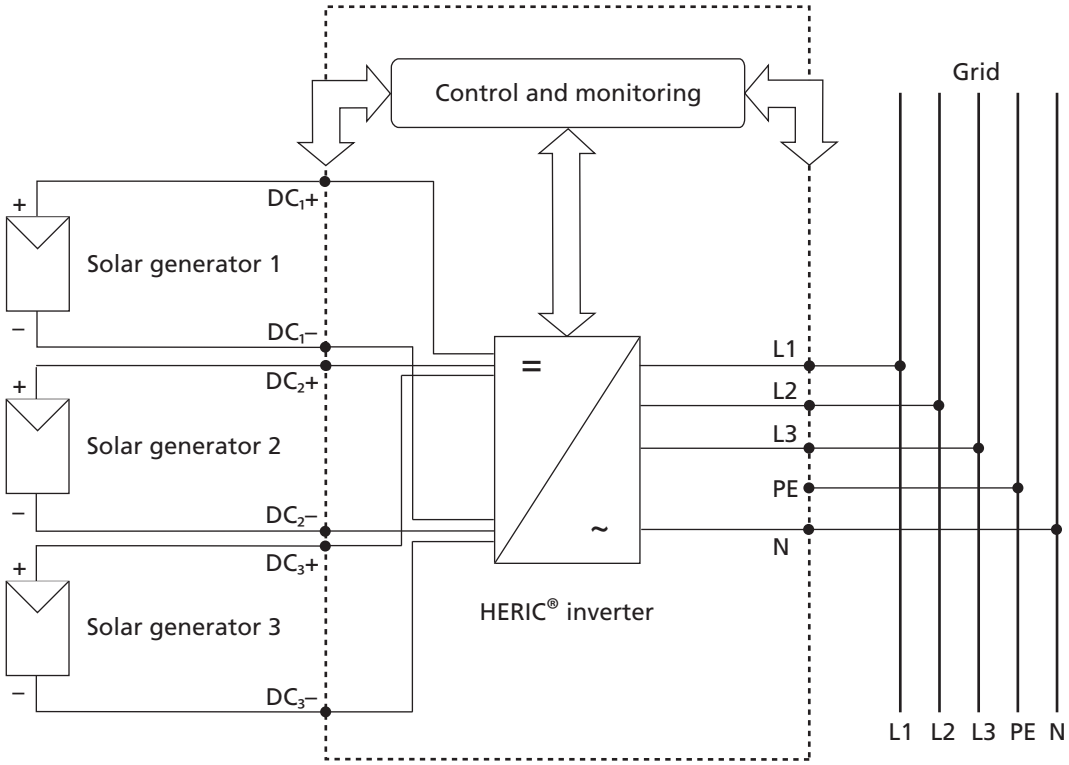
The Solar Inverter hardware already meets the requirements of the new Medium- and Low-Voltage Directive and will support all functions via software update by the end of the transitional period.

The output control through the PSC required according to the German Renewable Energy Act can be realised via the optional CAN power control box.

Solar Inverter configuration

The basic configuration of the NT Solar Inverter is shown in the block diagram.

The solar generator voltage connected to the inverter input is converted to alternating current by the high-efficiency HERIC® inverter. A 5-core AC connection is used.



1.3 Integration into solar system

Solar generator configuration

The technical data of the selected solar generator must match the Solar Inverter specification (see Technical Data). Incorrect dimensioning can lead to reductions in the yield and to destruction of the unit.

The Sundim design program from Sunways can be used for this purpose. Sunways Sundim can be found on the enclosed CD-ROM or on our website at http://www.sunways.eu/de/.

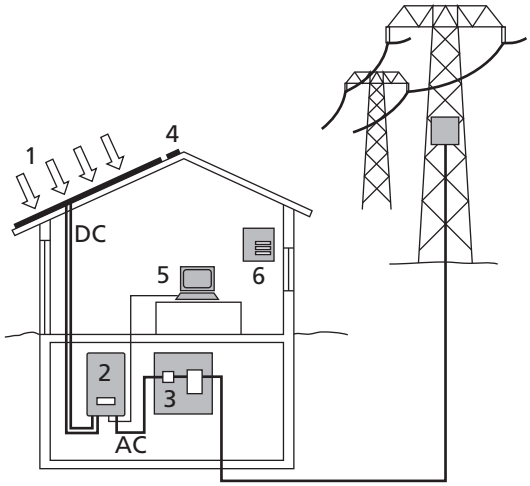
Be sure to take the following points into account before planning your system:

- Watch the celestial alignment of the modules. In Central Europe a maximum yield is achieved with a module tilt of 30° to the horizontal and direct south orientation of the solar generator field.

- The cell output decreases as the module temperature increases. Install your solar generator with sufficient ventilation at the rear.
- Check your solar generator approx. every three years for soiling. This occurs especially on the lower edge of the modules and forms a haze that cannot be washed off even by heavy rain. Yield reduction can be prevented by cleaning the modules with a wet cloth or a brush.
- Avoid shading of individual modules or solar cells in your system. This can lead to major reductions in yield.

Standard components of a solar system

Depending on the recommendations of your PV planning expert, your PV system consists of the following components:

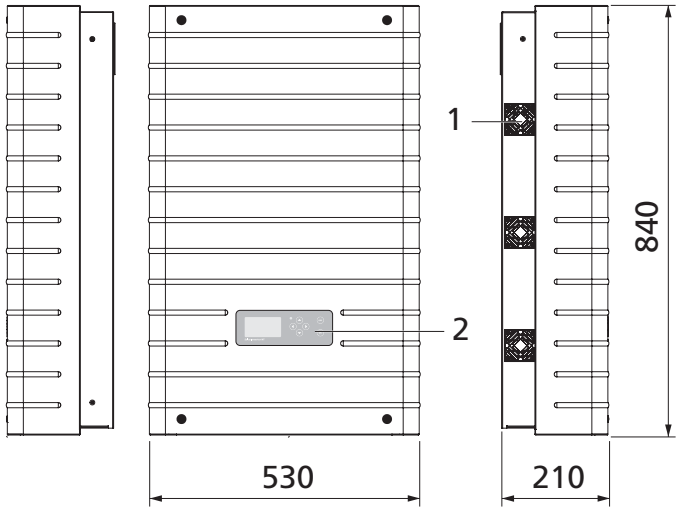


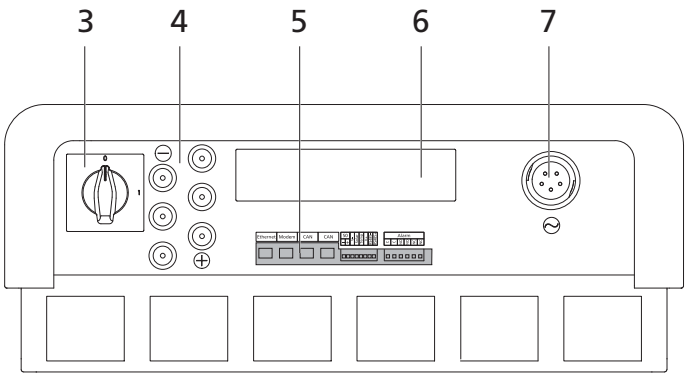
1 Solar generator
2 Solar Inverter with integrated DC load break switch
3 Mains fuse and energy meter

Options

4 Irradiance sensor with integrated temperature sensor
5 PC for monitoring system
6 large display

1.4 Module description





1 Fan
2 Control panel with LCD display, operating LED and console
3 DC Load Break Switch
4 DC terminals
5 Communication interfaces
6 Type label
7 AC connection

1.5 Delivery Scope

The delivery consists of:

- Sunways NT series Solar Inverter
- Wall bracket
- 3 pairs of Tyco Solarlok plug-in connectors
- AC connector
- CAN terminating resistor connector (connected)
- Ethernet cable, 2 m (CAT 5e, 1:1)
- Warranty registration
- SETUP - quick reference guide
- CD-ROM, including Manual, Sunways Sundim design program, product and service information

Checking delivery

Before shipment our products are checked for proper condition. Despite careful, recyclable packing, transport damage may occur, for which the transport company is generally responsible.

Please check the delivered Solar Inverter thoroughly.

Should you discover damage to the packing or the Solar Inverter, please inform the transport company immediately. Your specialist dealer will be happy to provide assistance if required. Any damage report must be received by the transport company in writing no later than seven days after receipt of the goods.

2 Safety precautions

2.1 General safety precautions

Follow the instructions in the operating manual.

Safe handling and trouble-free operation of the NT Solar Inverter requires knowledge of the basic safety precautions.

This user manual contains the most important information for operating the system safely.

Each person concerned with the installation, commissioning, maintenance and operation of the Solar Inverter must have read and understood the entire user manual, and in particular the chapter entitled Safety Precautions.

In addition, the rules and regulations for accident prevention applicable for the operating site/plant must be observed.

Risks associated with handling the NT Solar Inverter

The Solar Inverter has been built in accordance with state-of-the-art technology and the recognised safety rules and may only be used

- for its intended purpose and
- in safe condition.

Improper use may lead to dangers to the life and limb of the user or others, or can adversely affect the system or other property.

In case of malfunctions which can impair safety, the system must be shut down immediately and secured against being switched on again. The malfunction must then be eliminated immediately.

Warranty and liability

The General Terms and Conditions of Sale and Delivery of Sunways AG always apply. Warranty and liability claims for injuries and damage shall not be accepted if they are due to one or more of the following causes:

- Improper use of the Solar Inverter
- Improper installation, commissioning, operation and maintenance
- Operation of the Solar Inverter with defective and/or non-operational safety and protective equipment
- Failure to observe the information in the user manual regarding installation, commissioning, operation and maintenance
- Unauthorised modifications
- Inadequate monitoring of wearing parts
- Improper repairs
- Emergencies caused by external influence or force majeure
- Opening the cover and removing the safety seal without prior permission from Sunways AG

2.2 Explanation of symbols and warnings

The following warnings and symbols are used to help you quickly understand this manual and safely use the Solar Inverter.

Warnings used in this user manual

DANGER
This symbol indicates an immediate danger which will result in death, injury or serious damage if the applicable safety regulations are not followed.

DANGER
Danger of death through electric shock!
This symbol indicates an immediate danger from electric shock which will result in death, injury or serious damage if the applicable safety regulations are not followed.

CAUTION
CAUTION
This symbol indicates an immediate danger which can result in damage if the applicable safety regulations are not followed.

Symbols used in this user manual

NOTE
Information
This symbol indicates important information which contributes to a better understanding of the Solar Inverter.

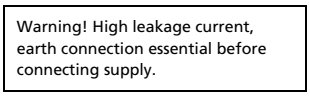
Warnings and symbols on unit

The following warnings on the housing of the Solar Inverter point out dangers. Always observe the warnings exactly.

This symbol indicates that the user manual must be read and understood before putting the unit into operation.

Hot surface! The housing can heat up during operation.

Always disconnect the unit from the mains supply and the PV generator before opening the cover. The unit still carries life-threatening voltage for approx. five minutes internally and at the connection terminals of the PV generator following disconnection from the PV generator. The energy storage capacitors are not completely discharged until after this time. You must wait at least five minutes after disconnecting the unit from the mains supply and from the PV generator before opening the unit.



WARNING

High leakage currents. Be sure to make an earthing connection before connecting the power supply circuit (AC system).

2.3 Basic safety measures

Electrical work on the Solar Inverter must be conducted by a qualified electrician while observing the VDE regulations, national and other regulations!

The Solar Inverter may only be opened by persons who are authorised by Sunways AG.

When circuit breakers are tripped, the cause of the fault must be determined and eliminated before returning the unit to operation.

Check electrical equipment regularly.

Retighten any loose connections.

Replace damaged lines/cables immediately.

2.4 Safety concept

The following parameters are monitored and displayed continuously and simultaneously by the inverter controller:

- DC overvoltage
- Overvoltage L1, L2, L3
- Undervoltage L1, L2, L3
- Over-/underfrequency L1, L2, L3
- Surge error (brief overvoltage L1, L2, L3)
- DC share in AC current
- AFI residual current
- Overtemperature of heat sink

When a malfunction occurs, feeding is immediately interrupted and the Solar Inverter disconnects from the grid by triggering the mains relay.

The potential-free alarm relay is activated.

If a residual current occurs on the DC side, only the affected power unit switches off. The same applies in th event of an insulation fault: Only the power unit in which the fault occurred switches off. The other power units continue operating normally.

In addition, the following protective equipment in accordance with overvoltage category III is provided on the grid and the solar generator side:

- Grid-side varistors

  These protect the power semiconductors in case of high-energy, short-term voltage peaks in the grid and dissipate the energy in the choke in case of a grid disconnection.

- Generator-side varistors

  Varistors offer protection against atmospheric overvoltages (e.g. caused by remote strikes during thunderstorms).

3 Technical data

Model	NT 10000	NT 11000	NT 12000
Article no.	**SI310NT0C**	**SI311NT0C**	**SI312NT0C**
DC input			
Rated DC output	10500 W	11550 W	12600 W
Maximum DC current	11.0 A per MPP input	11.5 A per MPP input	12.8 A per MPP input
Nominal DC voltage	340 V		
MPP voltage range	340 V…750 V		
Maximum DC voltage	900 V		
Number of DC connections per MPP tracker	1 x Tyco Solarlok		
Number of MPP trackers	3		
AC output			
Rated AC output	10000 W	11000 W	12000 W
Maximum AC output	10000 W	11000 W	12000 W
Nominal AC current	14.5 A per phase	16.0 A per phase	17.4 A per phase
Maximum AC current	16.0 A per phase	17.5 A per phase	19.0 A per phase
Nominal frequency	50 Hz		
Frequency range	47.5 Hz…50.2 Hz (according to DIN VDE 0126-1-1)		
Grid voltage	400 V		
AC voltage range	-20% to +15% (according to DIN VDE 0126-1-1)		
Distortion factor	< 1%		
Power factor (Cos Phi)	1 or configurable between -0.9 and +0.9		
Grid voltage monitoring	three-phase (according to DIN VDE 0126-1-1)		
Earth fault protection	RCD (according to DIN VDE 0126-1-1)		
Insulation, frequency and DC current monitoring	integrated according to DIN VDE 0126-1-1		
Required phases for grid connection	3 (L1, L2, L3, N, PE)		
Number of feed-in phases (230 V single-phase)	3		
Performance data			
Stand-by consumption	9 W		
Night-time consumption	~0 W		
Maximum efficiency	97.6%	97.6%	97.6%
Max. European efficiency	97.3%	97.2%	97.2%
MPP efficiency (static)	> 99%		
Circuit type	HERIC® topology, transformerless		

Model	NT 10000	NT 11000	NT 12000
Article no.	**SI310NT0C**	**SI311NT0C**	**SI312NT0C**
Other features			
DC switch according to IEC 60947-1/3	integrated		
Grid-connection fuse layout	3 x 25 A		
Data interfaces	Ethernet, CAN, RS485, potential-free signalling relay, S0, modem		
Sensor interfaces	irradiance, temperature		
Display	LCD dot matrix, backlit, 128 x 64 pixels		
System monitoring	Automatic alarms via e-mail, Sunways Browser, Sunways Portal		
IP rating according to IEC 60529	IP 54		
Max. relative humidity	95%		
Cooling	Forced ventilation via external fans, temperature-controlled		
Ambient temperature	-25°C to 50 °C (at full load)	-25°C to 45°C (at full load)	-25°C to 40 °C (at full load)
Overload characteristics	Working point adjustment		
Dimensions (height x width x depth)	84 x 53 x 21 cm		
Weight	31 kg		
Installation type	Wall installation		
Noise level	< 60 dB (A)		
Warranty			
Standard warranty	5 years		
Warranty extension to 10 years	Art. No. SV101020A		
Warranty extension to 15 years	Art. No. SV101050A		
Warranty extension to 20 years	Art. No. SV101080A		
Warranty extension to 25 years	Art. No. SV101110A		
Certificates	CE, DIN VDE 0126-1-1		

4 Installation

4.1 Mechanical installation

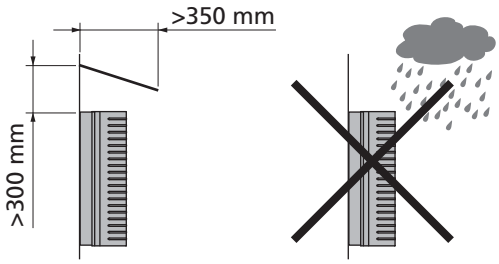
Requirements for installation location

DANGER

- The Solar Inverter must not be installed in areas subject to explosion hazards.
- The Solar Inverter must not be exposed to caustic gases.
- No combustible materials must be stored within 3 metres of the Solar Inverter.

Protection against moisture and foreign bodies

- The high IP54 protection rating allows installation indoors and in roof-covered areas outdoors. However, the Solar Inverter may not be directly exposed to rain.

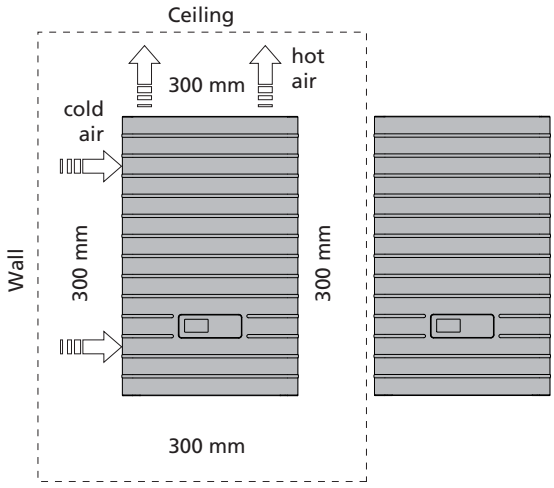


Mechanical load-bearing capacity

- Note during installation that the Solar Inverter weighs 31 kg. The installation surface must be firm and able to carry this weight in the long term.

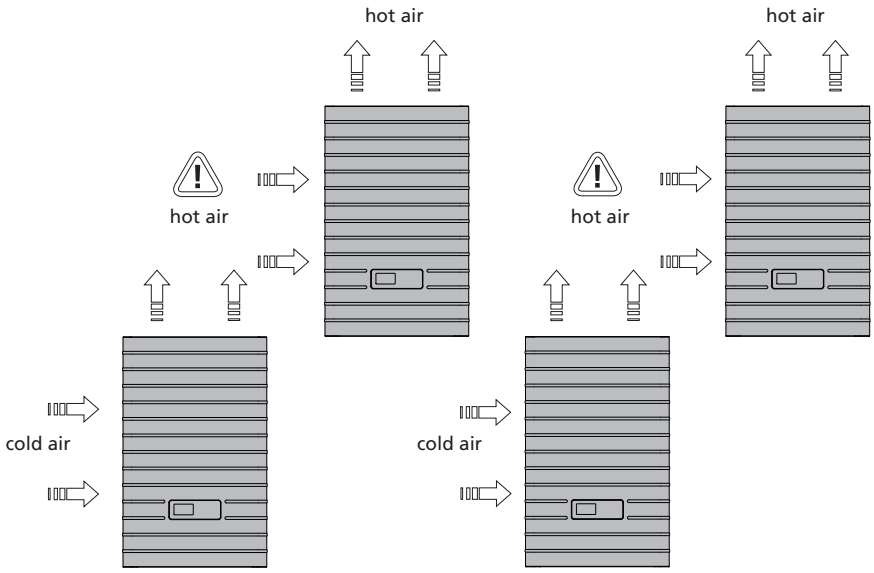
Thermal interaction

- The installation surface must consist of flame-retardant material (not suitable: wood or plastic surface; suitable: concrete and masonry), as the frame of the Solar Inverter can heat up to a maximum of 70°C.
- A minimum distance of 300 mm to other units, cabinets, ceilings, cable ducts, etc. must be maintained above, below and to the sides of the housing (see diagram).



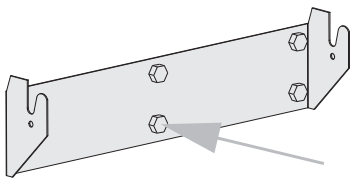
- The Solar Inverter must be installed upright to enable adequate free convection.

- Solar inverters may not be stacked in order to prevent excessive warming. In particular, due to the introduction of cold air from the left side, these devices must not be suspended above one another in a laterally offset manner.



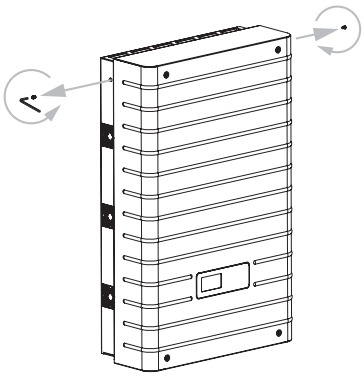
- Ensure sufficient heat dissipation when installing the Solar Inverter in a switch cabinet or closed room.
- The ambient temperature must be within the range -25 to +40 °C. At ambient temperatures above 40°C, the inverter automatically reduces its output.
- The Solar Inverter should not be exposed to direct sunlight to protect it from unnecessary external warming.

Installation

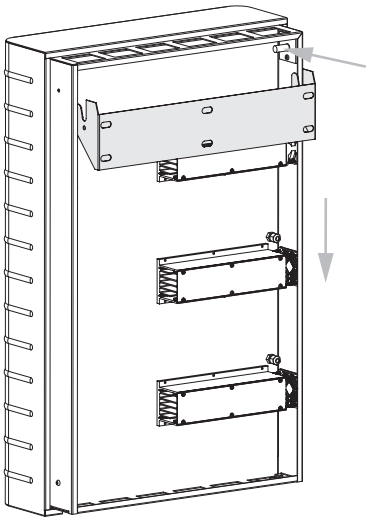


Proceed as follows to install the Solar Inverter:

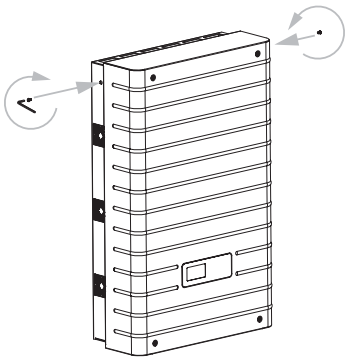
1. Hold the wall bracket at the point at which you want to attach the Solar Inverter and mark the mounting holes.
2. Drill the holes with a 10 mm dia. drill bit. A drilling template with precise dimensions can be found in the appendix.
3. Install the wall bracket with suitable screws and wall plugs depending on the surface condition.



4. Release the retaining screws for the Solar Inverter at the top on both sides with an Allen key.



5. Insert the retaining bolts found at the rear (top) of the Solar Inverter into the openings of the mounting frame.



6. Secure the Solar Inverter by retightening the retaining screws.

4.2 Electrical installation

Solar generator connection

DANGER
Extreme danger from electric shock!

- Touching live parts can result in death.
- All electrical work must be carried out by a qualified electrician while observing the VDE regulations, national and other regulations.
- Execute the direct current wiring in accordance with the system dimensioning of your planning expert.
- Prepare all solar generator cables before connecting the solar generator to the Solar Inverter.
- Check each solar generator string for proper operation with an open-circuit voltage and short-circuit current measurement.
- Check the rating plate on the Solar Inverter to ensure that it is approved for the maximum solar generator voltage.
- The positive and negative lines must be kept electrically separate from the earth potential.
- Touchable, live parts of the solar generator (e.g. metal frame, carrying structure, etc.) must be earthed (connection with PE).
- Check the solar generator for freedom from short-circuits to earth.

- Before connecting the solar generator to the Solar Inverter, open the integrated DC load break switch (position 0).
- After the solar generator is connected to the Solar Inverter and the DC load break switch is switched on, the direct generator voltage is present internally.
- The connectors must not be separated under load.
- Always disconnect the mains connection first by switching off the corresponding mains fuse and before disconnecting the solar generator side by opening the DC load break switch.

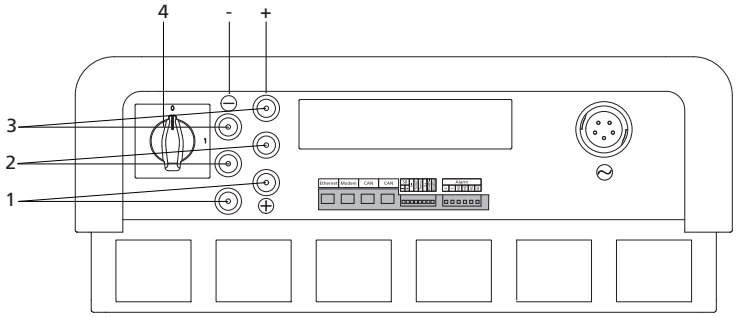
Overview

The solar generator can be directly connected to the Solar Inverter with three strings. The connection is made via the shockproof Tyco Solarlok plug-in connection system accessible from outside.

The Solar Inverter has three **independent** DC inputs, which are arranged in pairs on the underside.

NOTE

- The Solar Inverter consists of three power units that are controlled independently. Each power unit has its own DC connection.
- No external DC load break switch is required. A DC load break switch as required in accordance with DIN VDE 0100-712 is integrated in the Solar Inverter.



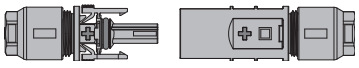
1 Terminals for solar generator string 1
2 Terminals for solar generator string 2
3 Terminals for solar generator string 3
4 DC Load Break Switch

Tyco Solarlok plug connector system

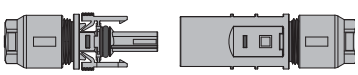
The Solarlok plug connector system is designed for convenient, reliable connection of individual solar generators and the Solar Inverter.

Components

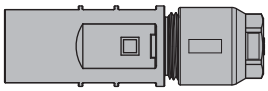
The following connectors are used:



Positively coded connector



Negatively coded connector



Neutral connector

NOTE
The neutral connector can be used to connect both positively and negatively coded sockets.

Installation

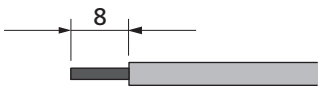
DANGER
Extreme danger from electric shock!

- Touching live parts can result in death.
- All electrical work must be carried out by a qualified electrician while observing the VDE regulations, national and other regulations.
- Tyco Solarlok connectors are only approved for connection on permanently installed lines.
- Only Tyco Solarlok crimping pliers may be used to crimp the connectors.
- During preassembly, the connectors must be separated from all other voltage sources.
- The connectors must not be separated under load. First interrupt the circuit at a suitable point.
- Provide the lines with corresponding stickers as close as possible to the connectors to prevent confusion.

NOTE

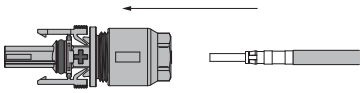
- Any kind of soiling (dust, moisture, etc.) has a negative effect on the connector system with regard to function over the intended period of use. This particularly applies to the suitability for use of the seals and the crimping of the contacts. Therefore, extreme care must be taken to achieve proper processing during assembly.
- Various circular contacts are used for different conductor cross-sections with the Tyco Solarlok connectors. The correct tool insert must be used in accordance with this cross-section. The included Tyco Solarlok connectors are equipped with circular contacts for a cable cross-section of 4 mm^2.
- The seals and clamping baskets used in the preassembled connectors are approved for cable sheath diameters from 4.5 mm to 6.9 mm. Special seals and clamping baskets must be used for cables with a sheath diameter greater than 6.9 mm.
- The Tyco Solarlok crimping pliers can be purchased from your sales partner.

The following sequence must be observed during assembly:

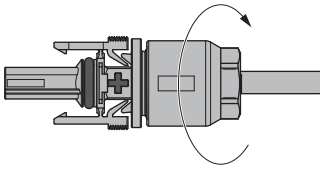


1. Strip the voltage-free line.

2. Crimping on the circular contact with the Tyco Solarlok hand crimping pliers.



3. Slide the cable gland onto the cable and engage the contact in the connector housing.

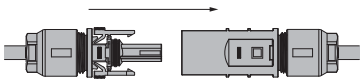


4. Tightening the cable gland with 1.5 Nm.

Handling

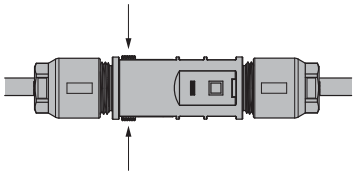
The positive/negative coded connectors are marked with polarity symbols and a coloured ring (blue = negative, red = positive. They are equipped with coding ribs for assignment, which ensure that only connectors of the same polarity can be connected to each other.

Connecting socket and plug:



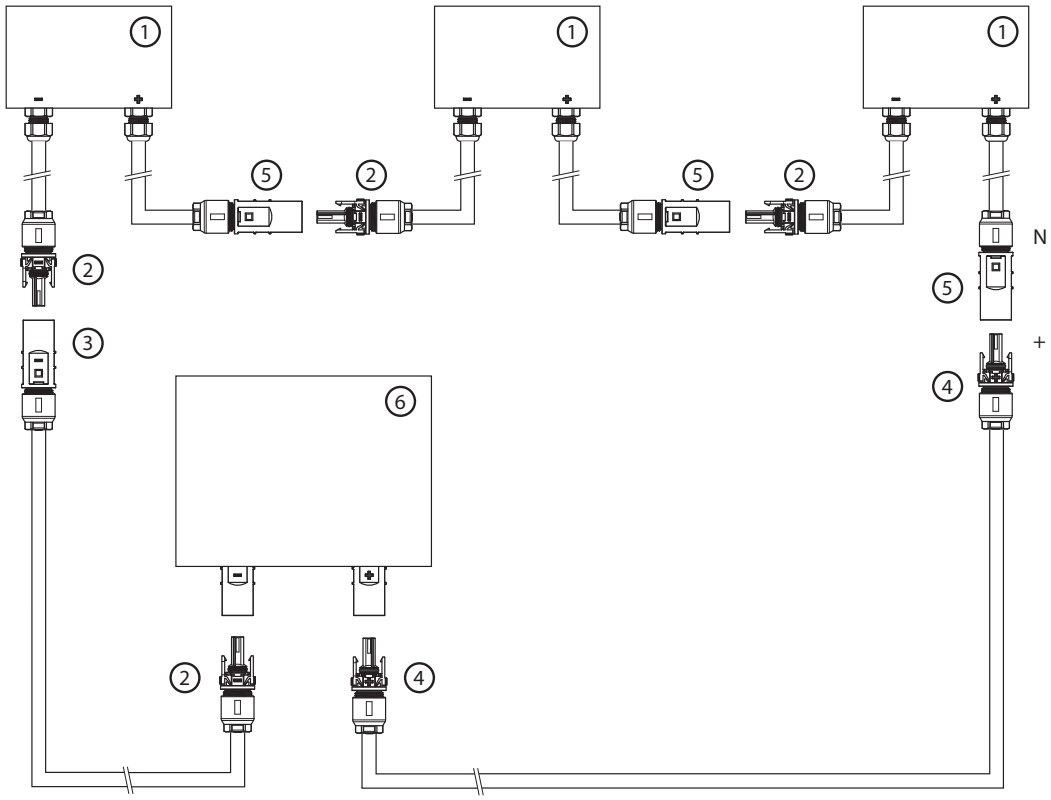
For the system to be locked properly the locking hooks must be recessed flush in the mating piece.

CAUTION
The connectors must not be separated under load. First interrupt the circuit at a suitable point.



Release the locking device by pressing on the ribbing of the locking hooks and pulling.

Connection example:



1 Solar module box
2 Negatively coded socket
3 Negatively coded plug
4 Positively coded socket
5 Neutral connector
6 Solar Inverter

Grid connection

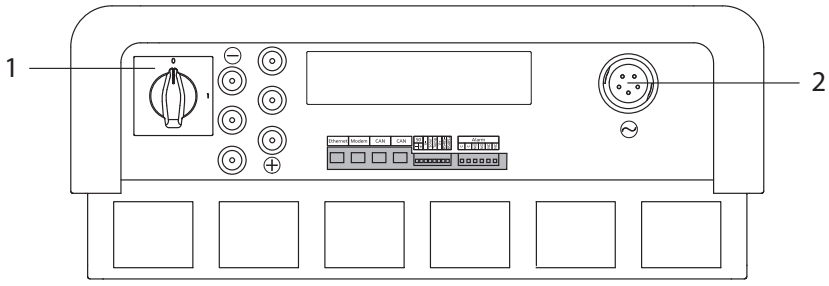
DANGER
Danger of death through electric shock!

- Touching live parts can result in death.
- All electrical work must be carried out by a qualified electrician while observing the VDE regulations, national and other regulations.
- Observe the pin assignment of the AC bayonet connector. An incorrect assignment can result in the unit being destroyed.
- No consumers may be connected to the supply line from the Solar Inverter to the mains fuse.
- Always disconnect the mains connection first by switching off the corresponding mains fuse and before disconnecting the solar generator side by opening the DC load break switch.

NOTE
If the voltage on the AC connection exceeds the permissible value due to a long line length or an insufficient cable cross-section, the Solar Inverter will be disconnected from the grid. In power grids with a low output and a high solar generator output, this can lead to individual Solar Inverters being switched off and then on again several times.

Overview

An AC bayonet connector on the underside of the unit is used for the five-wire grid connection (L1, L2, L3, N, PE) of the Solar Inverter. Three-phase feed-in is used.



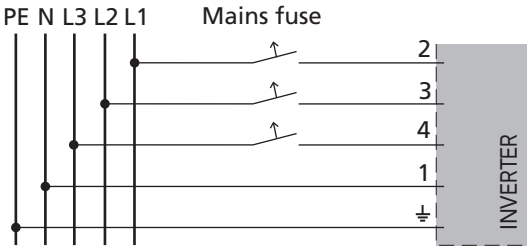
1 DC Load Break Switch 2 AC connection

A corresponding circuit breaker is recommended as a line protection element in the grid feed direction:

NT 10000: 3 x 25 A
NT 11000: 3 x 25 A
NT 12000: 3 x 25 A

with B type bracket

A three-pin circuit breaker or individual fuses can be used.



NOTE

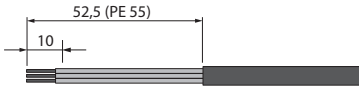
- Due to the fact that three-phase feed is used a three-phase meter must be used.
- Some grid operators require the use of a reverse-current-capable meter.

AC bayonet connector

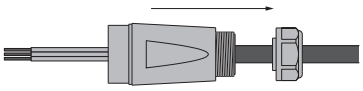
The AC bayonet connector is approved for cable sheath diameters between 13 mm and 20 mm.

The following sequence must be observed during assembly:

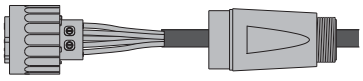
1. Strip the voltage-free line and the cable ends.



NOTE
For lines with a cable sheath diameter from 16 to 20 mm, the cable gland must be adapted accordingly. To do this, cut out the inner section of the blue sealing ring.

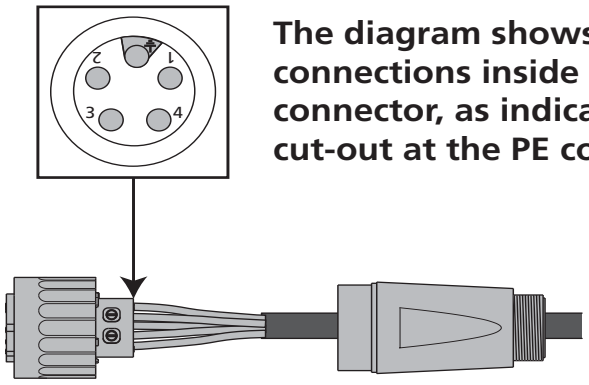


2. Slide the cable gland and the plug housing onto the cable.



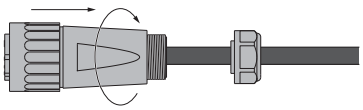
3. Connect the cable ends to the plug terminals in accordance with the pin assignment. Tightening torque: 0.7 Nm.

CAUTION
Observe the pin assignment of the AC bayonet connector. An incorrect assignment can result in the unit being destroyed. The diagram shows the connections inside the AC connector, as indicated by the cut-out at the PE connection.

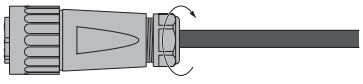


The diagram shows the connections inside the AC connector, as indicated by the cut-out at the PE connection.

1 = N (neutral conductor)
2 = L1 (feed-in phase)
3 = L2 (feed-in phase)
4 = L3 (feed-in phase)
⏚ = PE (protective earth conductor)



4. Screw plug housing to plug. To do this, push the outer ring of the plug toward the connector housing. Tightening torque: 1-2 Nm.



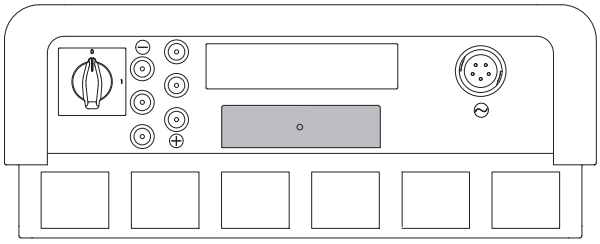
5. Tighten the cable gland.

   Tightening torque for cable sheath diameters between 13 and 20 mm: 6 to 8 Nm

NOTE
Make sure the line is provided with a strain relief device. When using cables with a diameter of less than 16 mm, the line must be relieved just behind the connector.

4.3 Installing the communication equipment

The interfaces are located behind the weatherproof connection box on the underside of the Solar Inverter.

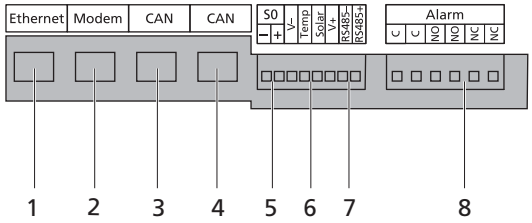


To open the connection box, loose the centre screw. Then carefully pull way the box toward the front.

After you have installed the connection cable, close the box again by guiding the locking hooks into the notches in the housing and then pressing the box onto the housing.

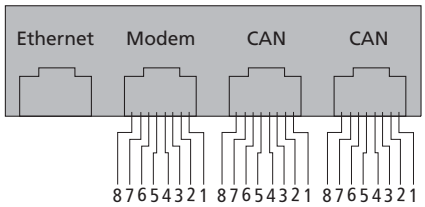
Retighten the mounting screw.

Interface overview



1 Ethernet connection
2 Modem connection
3 CAN IN
4 CAN OUT
5 S0 interface (pulse output, e.g. for large display)
6 Terminal for temperature and irradiance sensor
7 RS485 interface
8 Terminal for alarm relay

Pin assignment



The connectors for the CAN interfaces CAN IN and CAN OUT and for the modem interface have the following pin assignment:

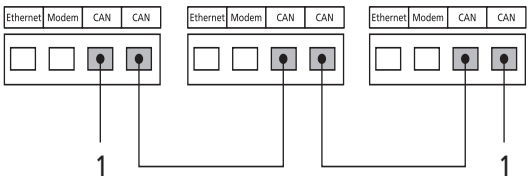
CAN and modem

	CAN		modem	
Pin	**Description**	**Meaning**	**Description**	**Meaning**
1	N.C.		>1	TXh

	CAN		modem	
Pin	**Description**	**Meaning**	**Description**	**Meaning**
2	CAN_GND	0 V / GND	>2	TX1
3	CAN_H	Bus line (dominant high)	<3	RXh
4	CAN_L_T	Termination	-4	VCC
5	CAN_H_T	Termination	-5	GND
6	CANL	Bus line (dominant low)	<6	RXI
7	CAN_SHLD	Optional CAN shield	<7	R1h
8	N.C.		<8	R1I

Networking Solar Inverters via CAN bus

Solar Inverters from the NT, AT und PT series can be networked via the CAN bus interface. Use the included Ethernet cable to network the Solar Inverters with each other. Connect a terminating resistor at the first and last Solar Inverter in the series. The pluggable terminating resistors are included in the delivery.



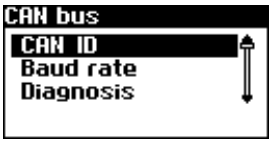
1 Terminating resistor connector

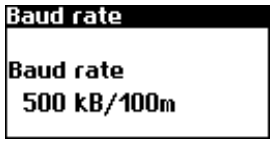
The total length of the CAN bus depends on the selected bit rate. The following table shows the possible bit rates and the resulting bus lengths.

Solar Inverters of the PT series are delivered with a default setting of 125 kbit/s. The default setting for Solar Inverters of the NT and AT series is 500 kbit/s.

Bit rate	**Bus lengt**
100 kbit/s	650 m
125 kbit/s	500 m
250 kbit/s	250 m
500 kbit/s	100 m

NOTE
When Solar Inverters from different series are networked the bit rate in all units must be identical. The rate can be set via the Solar Inverter display or the Sunways Browser.
Einstellung der Bitrate über das Display-Menü: Einstellungen - Vernetzung - CAN-BUS - Baudrate

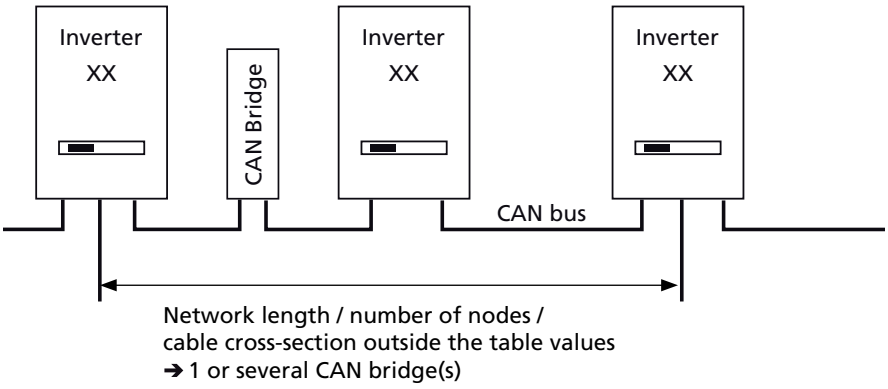




Up to 99 NT, PT and AT series units can be networked via a CAN bus. The following table shows the recommended cable cross-sections depending on the bus length and the number of nodes:

Bus length/Number of nodes	**32**	**64**	**99**
100 m	0.25 mm² or AWG 24	0.25 mm² or AWG 24	0.25 mm² or AWG 24
250 m	0.34 mm² or AWG 22	0.5 mm² or AWG 20	0.5 mm² or AWG 20
500 m	0.75 mm² oder AWG 18	0.75 mm² or AWG 18	1.0 mm² or AWG 16

In cases where the values specified in the table cannot be adhered to, a CAN bridge for boosting the signal must be installed, through which the length of the CAN bus can be extended by up to 500 m. The requirement to install a CAN bridge is therefore determined by the bus length, the number of nodes and the cable cross-sections.



The CAN bridge is available from Sunways. For further information please contact the Technical Hotline.

The CAN bridge subdivides the bus into two physically independent segments. The maximum cable length of each segment is determined by the set bit rate.

With a bit rate of 125 kbit/s two segments with a maximum length of 500 m each are possible. The total line length can therefore be up to 1 km under ideal conditions.

In systems with Solar Inverters from the PT series the CAN bridge can be integrated directly in the PT Solar Inverter and supplied via the 24 V DC power supply unit of the inverter. In systems with AT Solar Inverters and units from the new NT series (900 V) the CAN bridge can be integrated in the AC distribution. In this case an external 24 V DC supply is required (power consumption 1.5 W).

Networking Solar Inverters via RS485 interface

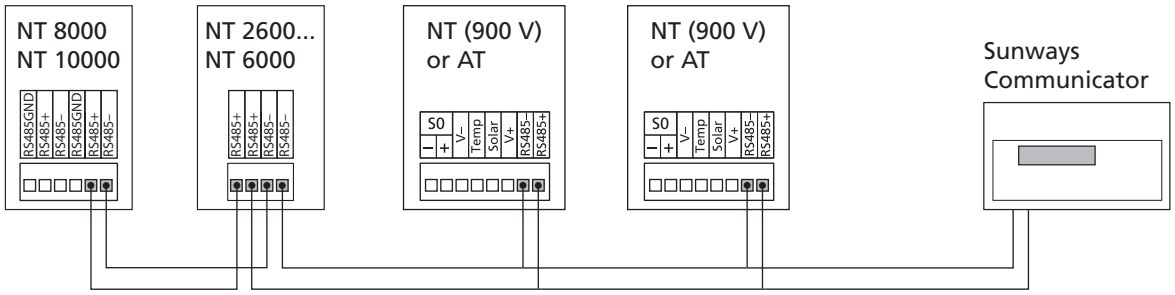
For joint monitoring of a solar system with Sunways Solar Inverters from the older NT generation (750 V or 850 V) you can use the RS485 interface integrated in the Solar Inverters. The system networked with the RS485 interface can be monitored with the Sunways Communicator.

NOTE

- Use a twisted pair cable to network the Solar Inverters with each other.
- Mount the terminating resistor on the last Solar Inverter.

  NT 8000 / 10000: Jumper **RS485MATCH**

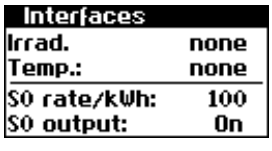
  NT 2600 to NT 6000: Jumper **JP400**



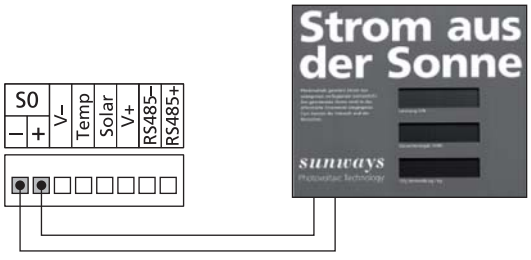
S0 interface

The S0 pulse output enables, for example, the connection of a large display (Sunways Display) for displaying the momentary output, the energy yields and the CO_2 reduction.

You can use the S0 interface on the main unit if you want to transmit the entire line yields as a sum to a large display.



The S0 interface is adjusted via the display on the inverter. Go to Settings - Network - Interfaces.



NOTE

- Please note that the maximum pulse rate may not be greater than 15 pulses/sec. Calculate the pulse rate depending on the size of the solar system using the following formula:

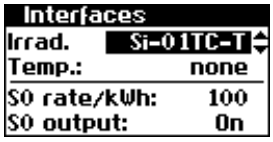
  Pulse rate [pulses/kWh] = 50,000 / system size [kWp]

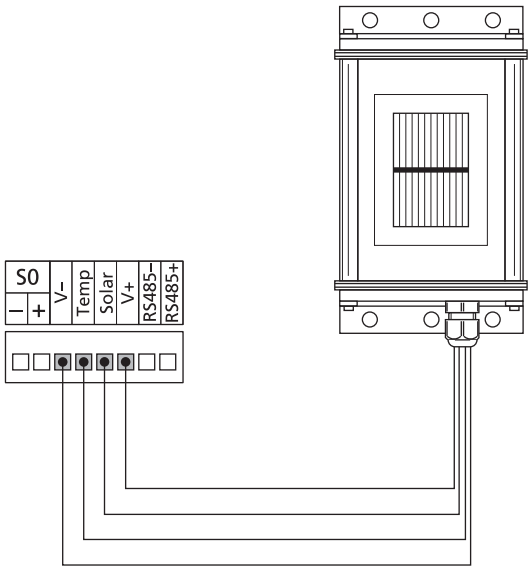
- The pulse rate must be set on your Solar Inverter and on the large display.

Temperature and irradiance sensor

The optional addition of an irradiance sensor (model Si-01TC-K from Ingenieurbüro Mencke & Tegtmeyer) with an integrated PT-100 temperature sensor for temperature measurement enables the acquisition of irradiation data and the corresponding module temperature and storage in the internal data memory as a 5-minute mean value. This additional measuring unit helps analyse the system output. Based on the values, any errors on the PV generator, e.g. shading or failure of solar cells, can be detected.

The sensor is activated via the display. In the menu Settings - Network - Interfaces you can select the sensor type in the Irrad. and Temp. field.





Assignment of sensor connection		
Sensor connector pin assignment	**Sensor connection designation**	**Solar Inverter connection designation**
Pin 1	Positive-signal temperature	Temp
Pin 2	Positive-signal irradiance	Solar
Pin 3	Reference earth	V-
Pin 4	Plus connection for +5 V supply	V+

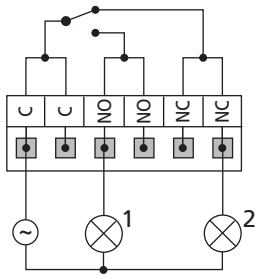
Connecting the alarm relay

The Solar Inverters are equipped with a potential-free alarm relay as standard. The relay can be designed as a make-contact element or as a break-contact element and is actuated for all malfunctions signalled by the device. This ensures fast, reliable indication of a possible fault in the PV system on site. For PV systems with several Solar Inverters the individual relays can be switched in parallel and connected via a common indicator lamp.

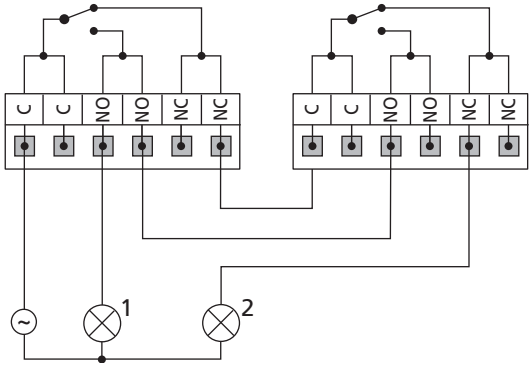
The main unit also signals faults from other units in the CAN network via the alarm relay. It is therefore sufficient for simple alerting to connect the alarm relay of the main unit.

CAUTION
The alarm relay is designed for 230 V/2 A. Higher outputs/voltages can result in the relay being destroyed. The connected signalling unit must be fused separately. The terminals are intended for a cable cross-section of 0.2 mm^2 to 1.5 mm^2. When dimensioning the cross-section, also take the current consumption of the connected signalling unit into account.

Wiring diagram for a single unit



Wiring diagram for several units



1 Indicator lamp, red

2 Indicator lamp, green

NOTE
The Solar Inverter is supplied by the feed phases from the AC grid. If all feed phases fail simultaneous, the alarm relay cannot respond, despite the fact that there is a fault.

5 Commissioning

5.1 Connecting and disconnecting Solar Inverter

CAUTION

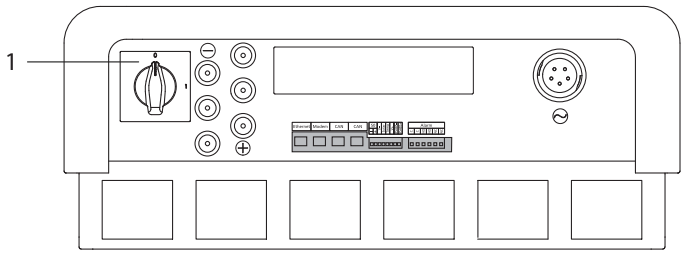
- Ensure proper mechanical and electrical installation before commissioning the Solar Inverter.
- Check the cables to ensure that they are in sound condition.
- Always disconnect the mains connection first by switching off the corresponding mains fuse and before disconnecting the solar generator side by opening the DC load break switch.
- The Tyco Solarlok connectors on the solar generator side must not be disconnected under load. First turn the DC load break switch to position 0.

NOTE

The Solar Inverter is supplied from the grid. The Solar Inverter switches on automatically when sufficient solar generator output is available. Corresponding switch-on and switch-off thresholds have been defined for this purpose.

Connecting

1. Establish the grid connection via the external circuit breaker.
2. Switch on the solar generator voltage by closing the DC load break switch (switching position 1). The Solar Inverter starts operating when the input voltage level is adequate.



1 DC Load Break Switch

The operating LED lights up in accordance with the operating state.

The commissioning menu opens when the Solar Inverter is connected for the first time.

Disconnecting

1. Interrupt the grid connection by switching off the circuit breaker.
2. Disconnect the solar generator side by opening the DC load break switch (switch position 0).

5.2 Commissioning

The commissioning menu comes up automatically when the Solar Inverter is connected for the first time. It helps you make the standard settings.

NOTE
For a better understanding of keyboard operation, please also see the chapter Operation.

The procedure for commissioning the Solar Inverter as a

- single unit
- and as a main unit and secondary units with several networked units

is described in detail below.

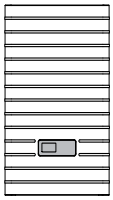
Please note:

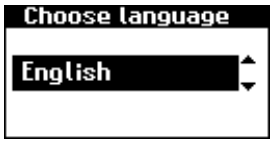
Once the system has been commissioned, the country can no longer be changed via the menu. To change the country retrospectively, please contact the Technical Hotline on
Tel +49 (0)7531 996 77-577.

Commissioning single unit

System with one Solar Inverter

Single device





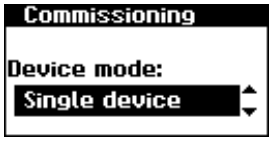
1. The commissioning process starts with setting of the display language. Select the language in selection menu with ▲ / ▼.

   Confirm the selected language with ok.

2. Select the country in the selection menu with ▲ / ▼.

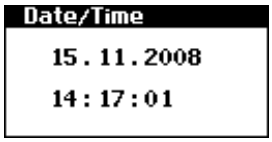
3. Confirm the country of installation with ok.

NOTE
The Solar Inverter only starts feeding current into the grid once the country has been selected.



4. Select "Single unit" in the selection menu with ▲ / ▼.

   Confirm with ok.



5. Set the date and time.

   Select the time with ok. Change the selected number with ▲ / ▼ and jump to the next number with ◀ / ▶.

   Apply the set time with ok and set the date accordingly.

   Apply the set date with ok.

NOTE
Please note that time settings should only be made with caution, as they directly affect data logging. For example, if you set the time back by 1 hour, then the existing data will be overwritten.

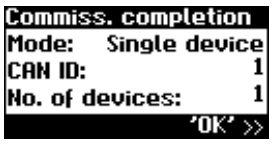
6. Setting a password. Select Password with ok. Default password is:

   ****

   A new password can be set with ▲ / ▼ / ◀ / ▶ as an option.

   Confirm the password with ok.

NOTE
Please note:
Only digits between 0 – 9 and letters between a – z and A – Z are permitted.
The password always has 8 characters. If the password you entered has less than 8 characters, the remaining characters are filled with *.
Example:
Your password is "Solar". This password has 5 characters. The system automatically appends three *, so that the password becomes "Solar***".

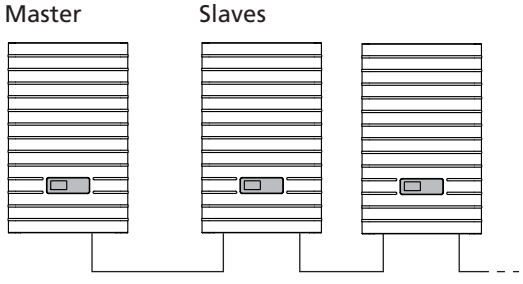


7. Completion of commissioning.

   Confirm overview with ok.

Commissioning several networked units

System with several Solar Inverters



Before commissioning, all units must be interconnected via the CAN bus interface. See the chapter on Networking Solar Inverters via CAN bus.

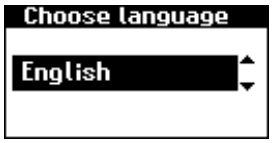
Switch on all units following installation. Start commissioning with the unit you selected as the main unit.

Compatibility between Sunways Solar Inverters

The following table provides an overview of which devices can be networked with each other and how, and lists any special considerations:

	NT series (900 V)	PT series	AT series	NT series (850 V)
NT series (850 V)	**with RS485:** • Sunways Portal: with Sunways Communicator	**NT with RS485 / PT with CAN bus:** • Sunways Portal: connect NTs with Sunways Communicator, PTs with Sunways Modem or DSL/network to the Internet • Sunways Browser: only available for PT	**with RS485:** • Sunways Portal: with Sunways Communicator • Sunways Monitor	**with RS485:** • Sunways Portal: with Sunways Communicator • Sunways Monitor: with interface converter
AT series	**with separate CAN networks:** • Sunways Browser • Sunways Portal: NT devices (900 V) must be operated in a separate CAN network with independent main unit	**with CAN bus:** • Sunways Browser • Sunways Portal • The PT Solar Inverter must be the main unit.	**with CAN bus:** • Sunways Browser • Sunways Portal	
PT series	**with separate CAN networks:** • Sunways Browser • Sunways Portal: NT devices (900 V) must be operated in a separate CAN network with independent main unit	**with CAN bus:** • Sunways Browser • Sunways Portal		
NT series (900 V)	**with CAN bus (CANopen/CiA437):** • Sunways Browser • Sunways Portal			

Commissioning main unit



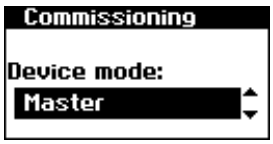
1. The commissioning process starts with setting of the display language. Select the language in selection menu with ▲ / ▼.

   Confirm the selected language with ok.

2. Select the country in the selection menu with ▲ / ▼.

3. Confirm the country of installation with ok.

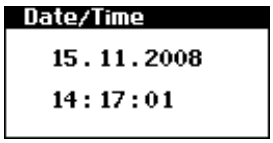
NOTE
The Solar Inverter only starts feeding current into the grid once the country has been selected.



4. Select "Main unit" in the selection menu with / .

   Confirm with ok.

NOTE
The other units in the CAN network are automatically configured as secondary units.



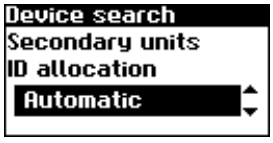
5. Set the date and time centrally for all connected units.

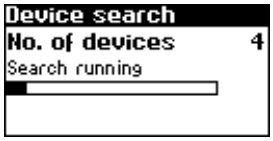
   Select the time with ok. Change the selected number with / and jump to the next number with / .

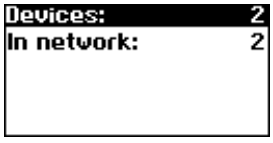
   Apply the set time with ok and set the date accordingly.

   Apply the set date with ok.

NOTE
Please note that time settings should only be made with caution, as they directly affect data logging. For example, if you set the time back by 1 hour, then the existing data will be overwritten.







6. Device search at the main unit.

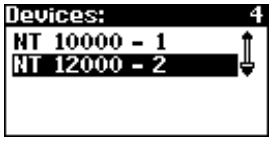
   The IDs for the secondary units can be allocated automatically or manually. When manual ID allocation is selected the ID must be requested at the secondary unit. With automatic ID allocation this step is not required, since the device IDs are assigned automatically.

   The following display appears during the device search:

   Units = total number of units found in the CAN network

   In network = number of configured units

   After the main unit has found all connected secondary unit, these must be configured before commissioning of the main unit is continued.



Confirm with ok.

NOTE
Depending on the side of the network, it may take a moment until the main unit has found all secondary units and added them to the list.

7. Set password centrally for all connected units. Select Password with ok.

   Default password is:

   ****

   A new password can be set with ▲ / ▼ / ◀ / ▶ as an option.

   Confirm the password with ok.

NOTE
Please note:
Only digits between 0 – 9 and letters between a – z and A – Z are permitted.
The password always has 8 characters. If the password you entered has less than 8 characters, the remaining characters are filled with *.
Example:
Your password is "Solar". This password has 5 characters. The system automatically appends three *, so that the password becomes "Solar***".

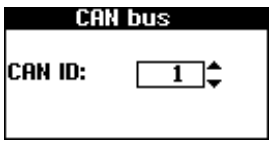
8. Completion of commissioning

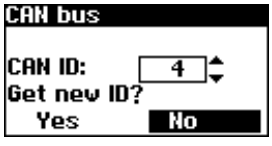
   Confirm overview with ok.

Commissioning secondary units

The procedure for commissioning secondary units depends on the type of device search. Once a main unit has been defined and manual ID allocation was selected (e.g. for systems with AT and PT), each secondary unit automatically displays a CAN ID request.

If automatic ID allocation was selected on the main unit, this step is skipped. In this case completion of commissioning must be confirmed with ok at each secondary unit.





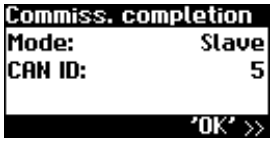
1. For manual device search only: Request CAN ID. Request the next higher free ID from the main unit with ▲ or the next lower free ID with ▼.

   The main unit assigns a free ID to the secondary unit. Confirm the ID within 5 seconds with ok.

   Request further IDs with ▲ / ▼.

   Confirm the CAN ID with ok within 5 seconds.

NOTE
The data for the individual secondary units can be assigned in the Sunways Browser and in the menu of the main unit based on the IDs.
The CAN-ID 1 is automatically assigned to the main unit. This means the secondary units can be assigned IDs from 2 to 99.
Commissioning cannot be continued until after an ID has been requested from the main unit.



2. Completion of commissioning

   Confirm overview with ok.

3. Commissioning all other secondary units as described above

Later commissioning

If you add new units or replace existing ones in your solar system, then you can display the unit list in the display on the master under Settings - Network - CAN bus. The new unit can then be put into operation in accordance with the description for commissioning slaves.

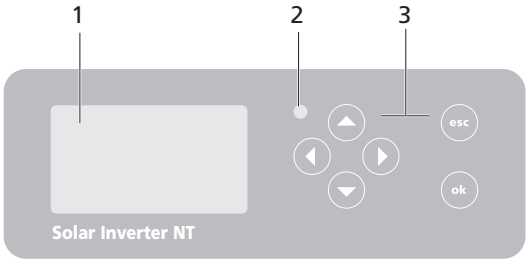
6 Operation

6.1 General information

Operating elements

Operating field

The Solar Inverter is operated via the control panel at the front.



1 LCD display (lighted)
2 Operating LED
3 Keyboard

LCD display

A graphics-capable, monochrome dot matrix display is integrated in the operating field. In standard mode the momentary output, daily yield and status are displayed. The bar graph shows the energy feed-in of the current day.

Press any key to activate the display lighting.

If no key is pressed for approx. 1 minute, the display lighting goes out.

NOTE
Important!
The LCD display is not a calibrated measuring device. A deviation of several percent is inherent in the system. Exact accounting of the data with the power supply company requires a calibrated meter.

Keyboard

The keyboard can be used to navigate in the menu, edit text fields, select entries from lists and enter numbers consecutively and digit by digit. User entries can only be made if the value to be changed is selected. The cursor changes visibly in the editing mode and indicates the digit to be changed.

button	Scroll up
button	Scroll down
button	Select menu item
button	Back one menu level
ok button	Select a menu item and confirm your entry
esc button	Quit

Operating LED

The combined red/green LED indicates the status of the Solar Inverter:

- LED off

Solar inverter is not active (night mode)

- LED green, continuously lit

  Solar inverter is active and feeds into power grid (MPP mode)

- LED green, flashing

  Solar inverter is active and feeds into power grid, although with current, output or temperature limitation

- LED red, continuously lit

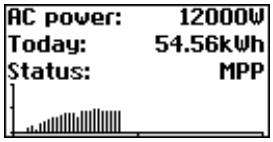
  A fault has occurred (malfunction)

- LED red, flashing

  Warning

Standard screen (single unit)

The standard screen is always shown when no keyboard entry is made for more than 1 minute. It can also be called up manually with the menu item Solar Inverter – Instantaneous Values.



The standard screen shows the most important data at a glance. In the first line you see the momentary feed-in power. In the second line the fed-in energy for the day is shown.

The status signals the unit status with the following messages:

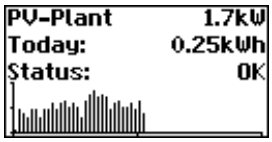
MPP	Feeding in MPP mode
OK	All networked devices are feeding in
AC cur.lim.	Feeding with AC current limitation
AC cur.lim.	Feeding with DC current limitation
Temp.lim.	Feeding with temperature limitation
Output lim.	Feeding with output limitation
Feed.	Feed
Warning	A warning has been output
Error	An error has occurred
Night	Night mode
Start	Device initialisation phase
COM-Upd	The communication software is being updated
Reg.Upd.	The control software is being updated
Ueb.Upd.	The monitoring software is being updated
Wif Upd.	The web interface is being updated
DWifUpd.	The dynamic web interface is being updated
MenSUpd.	The menu structure is being updated
MenFUpd.	The menu error texts are being updated
WifSUpd.	The web interface status texts are being updated
RWP.Upd.	The read/write parameters are being updated

ROP.Upd.	The read only parameters are being updated
ParaUpd.	Parameter update
Min Upd.	Update of the minute values in the data logger files
Day Upd.	Update of the daily values in the data logger files
Mon Upd.	Update of the monthly values in the data logger files
YearUpd.	Update of the annual values in the data logger files
SMinUpd.	Update of the minute values in the system data logger files
SDayUpd.	Update of the daily values in the system data logger files
SMonUpd.	Update of the monthly values in the system data logger files
SYerUpd.	Update of the annual values in the system data logger files

The graphic in the lower section of the screen shows the energy fed in for the day as a bar graph. The current period is shown as a flashing bar, as it is still increasing.

Standard screen (system)

You can view the system data for a CAN-networked system with this screen.



Next to the total current system output, you also see the energy yield of your solar system and any status messages of all connected units. These are provided with the inverter number. An 'M' means that the error has occurred on the main unit.

NOTE

- The various functions are accessed via the menu. The main menu is opened from the standard screen by pressing esc twice.
- You can return to the standard screen at any time by pressing and holding the esc key.
- If a status message is shown you can open the error list directly with ok .
- You can access other instantaneous values from the standard screen with ▲ and ▼.

Access rights

Die Bedienung des Solar-Inverters ist in verschiedene, durch Passwörter geschützte Bereiche gegliedert.

Das Passwort ist 8-stellig.

Das Passwort kann im Menüpunkt «Einstellungen – Anmeldung» eingegeben werden.

NOTE

Erfolgt nach der Eingabe des Passwortes keine Eingabe über die Tastatur, ist nach etwa 5 Minuten eine erneute Eingabe des Passwortes erforderlich.

Customer area

The customer password must be entered to access this area. All settings can be made which are required for installation and commissioning of the Solar Inverter.

NOTE

The password for the customer area is:
****
The password is preset and is directly confirmed with ok.
As an option you can assign a personal password in the Commissioning menu.
Only digits between 0 – 9 and letters between a – z and
A – Z are permitted.
The password always has 8 characters. If the password you entered has less than 8 characters, the remaining characters are filled with *.
Example:
Your password is "Solar". This password has 5 characters. The system automatically appends three *, so that the password becomes "Solar***".

Installer area

In this section the installer can make special settings on the Solar Inverter which are only possible after consulting the Technical Hotline. Request a device-specific password from the Technical Hotline.

Technical hotline +49 (0) 7531 996 77-577

Country password

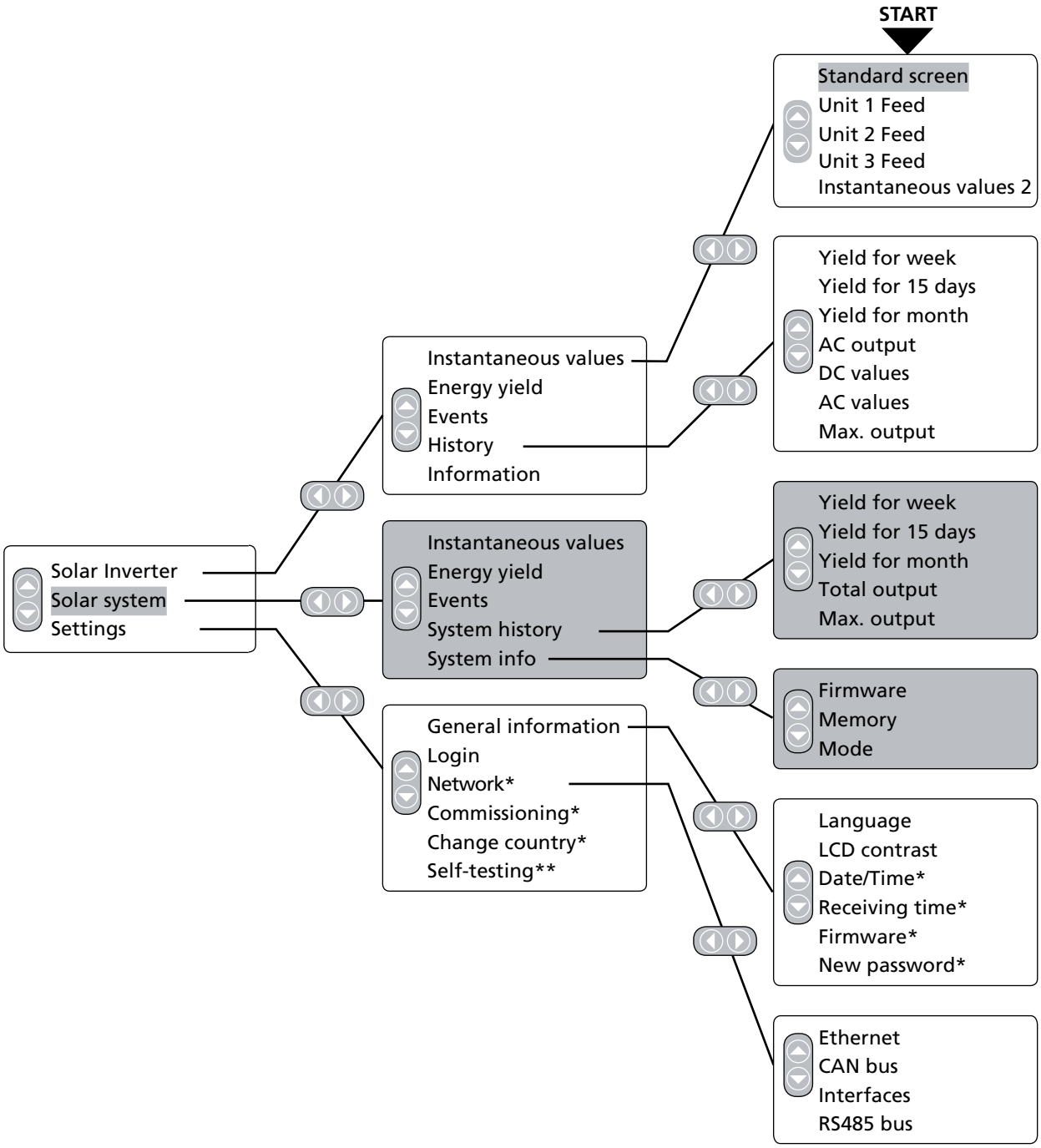
Changing the country setting after commissioning requires an installer password, which can be obtained from the Technical Hotline. The last 8 digits of the installer password form the country password.

NOTE

Each country has specific regulations for grid connection of inverters. By selecting the country the settings for the switch-off parameters are set according to the standards for this country.

Menu structure

You can access all screens on the Solar Inverter with the menu. The menu is opened by pressing the left arrow key from the standard screen.

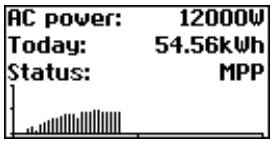
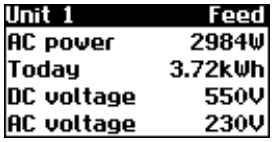
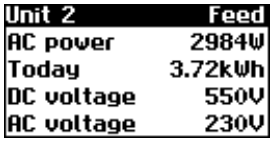
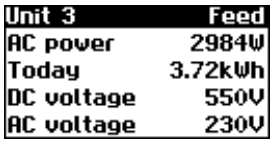
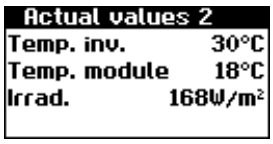
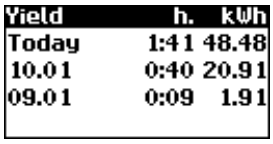
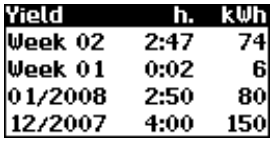
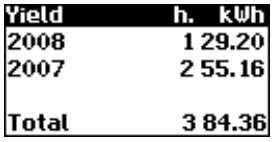
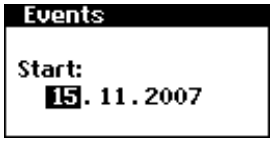
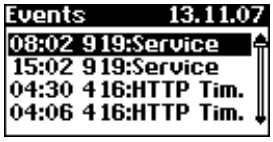


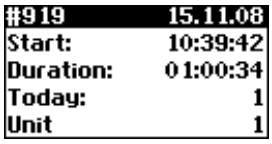
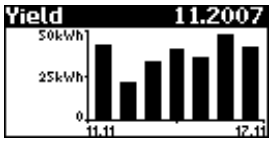
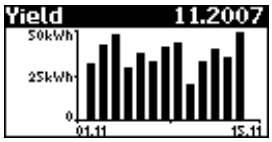
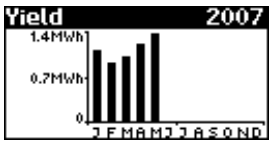
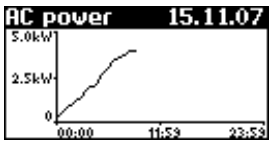
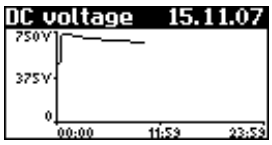
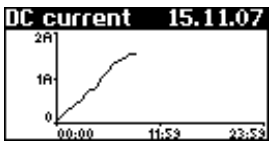
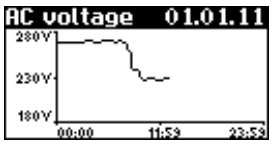
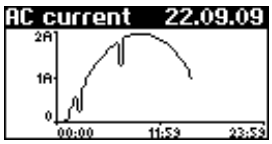
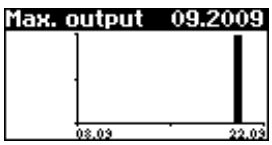
NOTE

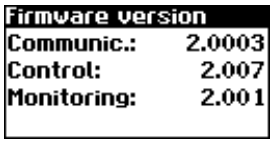
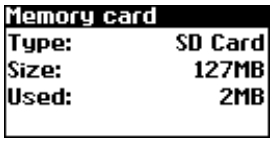
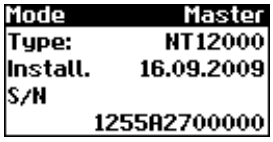
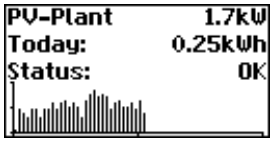
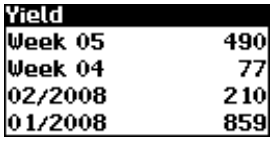
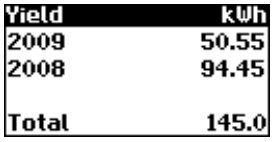
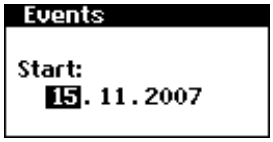
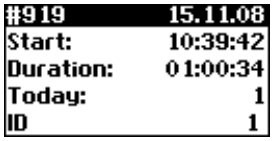
- The areas highlighted in grey are only available in the main unit
- *) after entering the customer password. Standard password: ******** (= 8 asterisks)
- **) This is only shown if the configured country of installation is Italy.

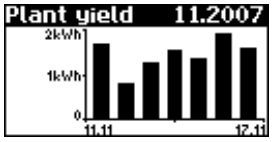
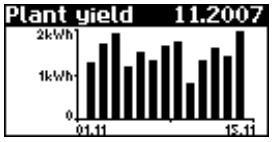
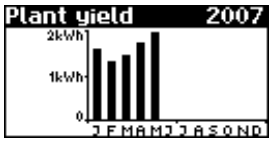
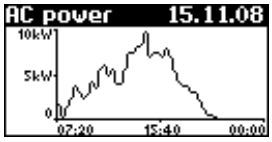
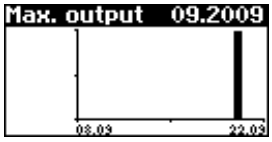
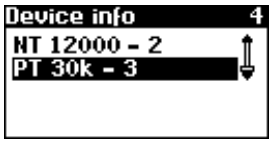
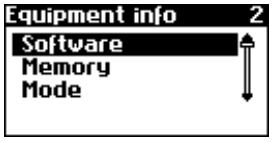
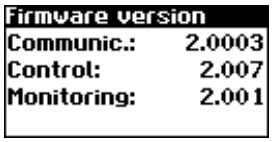
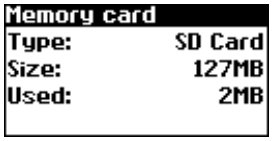
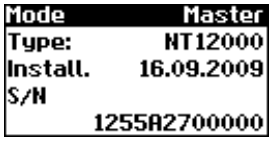
Overview of screen displays

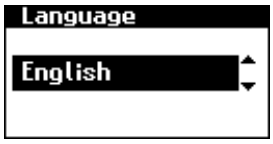
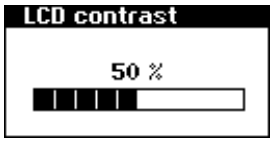
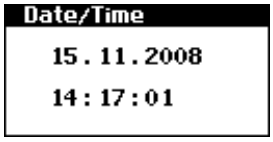
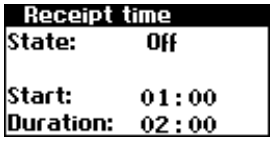
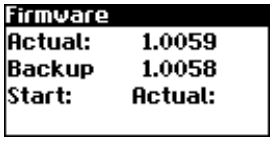
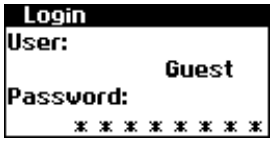
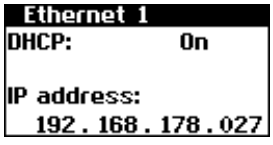
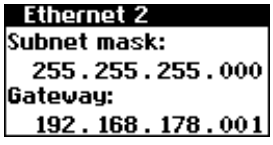
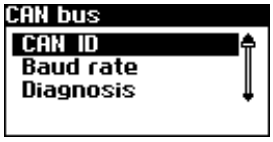
Display	Description	Calling Menu
Instantaneous Values – Unit		

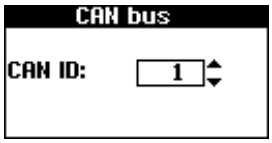
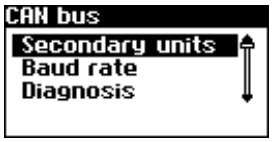
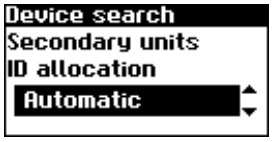
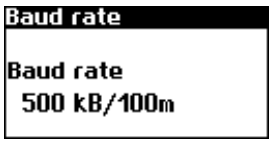
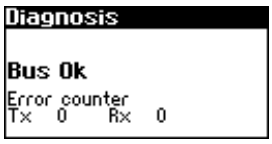
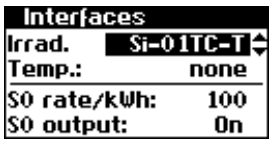
Display	Description	Calling Menu
	Current feed-in power, daily energy yield and unit status MPP: Feeding in MPP mode	The screen appears automatically if no key is pressed for several minutes. Solar inverter – Instantaneous values
	Shows the output, the power fed in today, and the DC and AC voltage of power unit 1	Solar inverter – Instantaneous values – ▼
	Shows the output, the power fed in today, and the DC and AC voltage of power unit 2	Solar inverter – Instantaneous values – ▲
	Shows the output, the power fed in today, and the DC and AC voltage of power unit 3	Solar inverter – Instantaneous values – ▲
	Interior temperature of unit (Temp.Inv.) and temperature and irradiation values (if sensor is connected)	Solar inverter – Instantaneous values – ▲
Instantaneous values – Yields		
	AC yields and operating hours from today, yesterday and the day before yesterday	Solar inverter – Energy yield
	AC yields and operating hours for the current week, the previous week, the current month and the previous month	Solar inverter – Energy yield – ▼
	AC yields for the current year and the previous year	Solar inverter – Energy yield – ▼
Events – Unit		
	Select starting data for event display	Solar inverter – Events
	Display event list	Solar inverter – Events – ok

Display	Description	Calling Menu
	Display event details (error number, data, starting time, duration and number of occurrences per day)	Solar inverter – Events – ok – ok
History – Unit		
	Daily yield for 1 week	Solar inverter – History – Yield for week
	Daily yields for 15 days	Solar inverter – History – Yield for 15 days
	Monthly yields	Solar inverter – History – Yield for month
	AC output (5-min. values)	Solar inverter – History – AC output
	DC voltage (5-min. values)	Solar inverter – History – DC output
	DC current (5-min. values)	Solar inverter – History – DC output – ▼
	AC voltage (5-min. values)	Solar inverter – History – AC output
	AC current (5-min. values)	Solar inverter – History – AC output – ▼
	Maximum output	Solar Inverter – History – Max. output
Information – Unit		

Display	Description	Calling Menu
	Firmware	Solar Inverter – Information – Firmware
	Memory card	Solar Inverter – Information – Memory
	Device mode	Solar Inverter – Information – Mode
Instantaneous values – Solar system (display only main unit)		
	Current system feed-in power, daily energy yield and system status	The screen appears automatically on the main unit if no key is pressed for several minutes. Solar system – Instantaneous values
Yields – Solar system (display only main unit)		
	AC system yields and operating hours from today, yesterday and the day before yesterday	Solar system – Energy yield
	AC system yields for the current week, the previous week, the current month and the previous month	Solar system – Energy yield – ▼
	AC system yields for the current year and the previous year	Solar system – Energy yield – ▼
Events – Solar system (display only main unit)		
	Select starting data for system event display	Solar system – Events
	Display event list for entire system	Solar system – Events – ok
	Display event details (error number, data, starting time, duration and number of occurrences per day)	Solar system – Events – ok – ok

Display	Description	Calling Menu
History – Solar system (display only main unit)		
	Solar system daily yield for 1 week	Solar system – System history – Yield for week
	Solar system daily yield for 15 days	Solar system – System history – Yield for 15 days
	Solar system monthly yields	Solar system – System history – Yield for month
	Solar system AC output (5-min. values)	Solar system – System history – AC capacity
	Maximum system output (daily maximum values)	Solar system – System history – Max. capacity
System info – Solar system (display only main unit)		
	Unit list for selecting a unit	Solar system – System info
	Selection of information	Solar system – System info – ok
	Firmware	Solar system – System info – Firmware
	Memory card	Solar system – System info – Memory
	Device mode	Solar system – System info – Mode
Settings – General		

Display	Description	Calling Menu
	Display language	Settings – General – Language
	LCD contrast	Settings – General – LCD contrast
	Set date/time (only possible with customer password)	Settings – General – Date/Time
	Set receiving time (starting time and duration in which the unit can also be addressed in the night mode via the network). (only possible with customer password)	Settings – General – Receiving time
	Firmware versions	Settings – General – Firmware
	Changing the customer password (only possible with customer password)	Settings – General – Password
Settings – Login		
	Password entry to access advanced settings (necessary for commissioning)	Settings – Login
Settings – Network (only possible with customer password)		
	Network settings (Screen 1): Activate DHCP for the automatic IP address setting or enter IP address manually	Settings – Network – Ethernet
	Network settings (Screen 2)	Settings – Network – Ethernet –
	Only for secondary unit	Settings – Network – CAN bus

Display	Description	Calling Menu
	Only for secondary unit with manual CAN ID setting: CAN ID request	Settings – Network – CAN bus – CAN ID
	Main unit only	Settings – Network – CAN bus
	Selection at the main unit: Type of ID allocation for the secondary units	Settings – Network – CAN bus – Secondary units
	Setting the baud rate	Settings – Network – CAN bus – Baud rate
	Function test for the CAN connection	Settings – Network – CAN bus – Diagnostics
	Setting of the irradiance and temperature sensor and configuration of the S0 pulse output	Settings – Network – Interfaces

Error messages

The Solar Inverter indicates malfunctions in the LCD display and saves these in the internal error memory.

The fault display consists of a number and a short description. Based on the first number you can quickly recognise which area the fault has occurred in:

1: Solar generator fault

2: AC grid fault

3: Inverter fault

4: Interface/communication fault

5: Interface/communication warnings

6: Remote access warnings

9: Service fault

If an error is shown in the standard display, then you can look up the exact error message in the menu under Solar inverter – Events.

NOTE

- A restart may be attempted in the event of an error message.
- Please note the serial number of the unit and the error number before contacting the Technical Hotline.
- The Technical Hotline can be contacted on +49 (0) 7531 996 77-577 between 7.30 am and 6 pm CET during weekdays.

Display message	Description	Cause and possible remedies
Solar generator fault		
101:U-DC max.	Your NT Solar Inverter is approved for a maximum solar generator open-circuit voltage of 900 V. All DC input components are adequately dimensioned with a safety margin. If the threshold is exceeded, the Solar Inverter stops feeding.	The maximum DC voltage was exceeded. • Check the dimensioning of your PV generator. Too many modules are connected in series. • Reduce the number of modules and re-commission the system.
102:Insulat.	Before each connection, your Solar Inverter checks the PV system for a possible earth or insulation fault. If this kind of error is detected, no feed in takes place. The mode of operation is compliant with DIN V VDE 0126-1-1.	The Solar Inverter has discovered an insulation fault in the PV system during run-up. • Check your PV system for possible insulation faults (damaged DC cables etc.). The measured insulation resistance must be at least 900 kΩ.
103:AFI>30mA **105:AFI>60mA** **106:AFI150mA**	Your Solar Inverter is equipped with an AC/DC sensitive AFI according to DIN VDE 0126-1-1. The monitoring unit has detected a relative residual current increase.	A sudden residual current increase has occurred during Solar Inverter operation. • Check your PV system for possible insulation faults.
104:AFI>0.3A	Your Solar Inverter is equipped with an AC/DC sensitive AFI according to DIN VDE 0126-1-1. This monitoring unit has detected an absolute residual current of >300 mA.	A residual current has occurred during Solar Inverter operation. • Check your PV system for possible insulation faults.
AC grid fault		
201:Surge e.	Your Solar Inverter continuously monitors the quality of the AC grid. During high voltage peaks on the phase feeding in, the Solar Inverter stops feeding and attempts a restart.	The Solar Inverter has detected a high voltage peak on the phase feeding in. • After troubleshooting the Solar Inverter restarts automatically. Should the error occur frequently, please contact your power supply company. A monitoring phase and a neutral conductor were interchanged during connection of the AC side.
202:UAC1>10%	Your Solar Inverter continually monitors the voltage level of the phase feeding in. If the maximum permissible limit is exceeded, the Solar Inverter stops feeding and does not start up again until the voltage value drops below the maximum permissible limit.	The cable cross-section in the AC supply line to the Solar Inverter is too small. Your inverter feeds into a spur line, which is insufficiently dimensioned. • Check the design of your grid connection (energy meter) or the grid feed point to your power supply company (PSC). • Ask your power supply company (PSC) about grid stability and design.

Display message	Description	Cause and possible remedies
203:UAC1>Max **205:UAC2>Max** **207:UAC3>Max**	Your Solar Inverter continuously monitors the voltage levels for feed phases L1, L2 and L3. If the maximum permissible limit is exceeded, the Solar Inverter stops feeding and does not start up again until the voltage value drops below the maximum permissible limit.	The cable cross-section in the AC supply line to the Solar Inverter is too small. Your inverter feeds into a spur line, which is insufficiently dimensioned. • Check the design of your grid connection (energy meter) or the grid feed point to your power supply company (PSC). • Ask your power supply company (PSC) about grid stability and design.
204:UAC1<Min **206:UAC2<Min** **208:UAC3<Min**	Your Solar Inverter continuously monitors the voltage levels for feed phases L1, L2 and L3. If the voltage falls below the minimum permissible limit, the Solar Inverter stops feeding and does not start up again until the voltage value exceeds the minimum limit value. If the voltage drops below 160 V, the supply is no longer adequate for the Solar Inverter.	• Ask your power supply company (PSC) about grid stability and design.
210:Frq1>Max **211:Frq1<Min**	The Solar Inverter continually monitors the grid frequency of the phase feeding in. If this is outside the permitted range, the Solar Inverter stops feeding and does not start up again until the value is within the tolerance range.	• Ask your power supply company (PSC) about grid stability and design.
212:DC share	Your Solar Inverter continually monitors the quality of current fed in. If an increased DC share is found in the current fed in, the Solar Inverter stops feeding.	• Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.
213:UAC1>10% (Warning)	The voltage of the phase feeding in is higher than 10% above the nominal value. If this is the case for longer than ten minutes, the inverter stops feeding and does not switch on again until the voltage drops below this limit again.	The cable cross-section in the AC supply line to the Solar Inverter is too small. Your PV system feeds into a spur line, which is insufficiently dimensioned. • Ask your power supply company (PSC) about grid stability and design. • Check the design of your grid connection (energy meter) or the grid feed point to your power supply company (PSC).
224:AC P. fail	Your Solar Inverter has detected a mains power failure.	• Ask your power supply company (PSC) about grid stability and design.

Display message	Description	Cause and possible remedies
225:UV excon **226:OV excon**	Your Solar Inverter is equipped with a high-quality redundant grid monitoring function according to DIN V VDE 0126-1-1 and constantly monitors the grid. If one of the phases fails, or if the phase position between the individual conductors changes, the Solar Inverter stops feeding and does not start up again until the error is eliminated.	Check phases L2 and L3. • Ask your power supply company (PSC) about grid stability and design.
227:L1	Your Solar Inverter continuously monitors the output current. Excessive current rise was detected.	• Ask your power supply company (PSC) about grid stability and design.
Inverter fault		
301:AFI over	The integrated sensor for measuring the residual current has been operated outside its measuring range.	A residual current was detected during start-up. • Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.
303:Overtmp.	Your Solar Inverter is designed for an ambient temperature of up to +40?. When a specified temperature threshold of the heat sink is reached, the feed line is linearly reduced in size. Should the heat sink temperature nevertheless continue to increase, feeding is stopped. After the heat sink temperature drops, the Solar Inverter starts up again automatically.	The maximum permissible ambient temperature has been exceeded. • The installation location is not suitable. Please find another installation location. The air circulation requirement was not taken into account during installation. • Clean the Solar Inverter, if dirt prevents cooling. • Observe the installation distances specified in the manual. Objects were laid on the heat sink and unimpaired convection was prevented. • Remove the objects.
304:Grid re.	The NT Solar Inverter always checks the function of the mains relay before it is switched on. An error was detected during this check.	• Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.
305:AFI test	The NT Solar Inverter always checks the function of its residual-current monitoring unit before it is switched on. An error was detected during this check.	• Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.

Display message	Description	Cause and possible remedies
306:T. meas.	The NT Solar Inverter is equipped with a temperature sensor that monitors the heat sink temperature. This message appears if the sensor reports a value outside its value range or if the sensor cable is damaged.	The ambient temperature of the Solar Inverter is outside the permissible range (< -25°C). • Wait until the temperature is back in the permissible range. A cable break has occurred in the sensor which monitors the heat sink temperature. • Please contact the Technical Hotline. The phone number is provided on the back of the manual.
307:Overtmp. (Warning)	Your Solar Inverter is designed for an ambient temperature of up to +45?. When a specified temperature threshold of the heat sink is reached, the feed line is linearly reduced in size. Should the heat sink temperature nevertheless continue to increase, feeding is stopped. This warning appears when the current heat sink temperature is just below the switch-off threshold.	The maximum permissible ambient temperature has been exceeded. • The installation location is not suitable. Please find another installation location. The air circulation requirement was not taken into account during installation. • Clean the Solar Inverter, if dirt prevents cooling. • Observe the installation distances specified in the manual. Objects were laid on the heat sink and unimpaired convection was prevented. • Remove the objects.
309:control	The software version of the control software is incompatible.	• Carry out a software update.
310:no config	No country is set.	Contact the Technical Hotline for the installer password. The phone number is provided on the back of the manual. Reset the country of installation according to the explanatory notes in section 4.2 Commissioning.
Interface/communication fault		
401:SD card	The Solar Inverter cannot find an SD card.	• Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.
402:SD card	The SD card is write-protected.	• Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.
403:CAN user	Communication error with CAN user.	• Check whether an error has occurred in the secondary CAN unit. Restart the secondary unit and main unit if necessary.

Display message	Description	Cause and possible remedies
404:CAN bus	CAN bus not in operation.	No communication is possible via the CAN bus. • Check the bus cables and termination resistors. • Check whether the maximum line lengths are within the permitted limits. • Check whether bus cables were installed parallel to power cables. Separate bus lines and power cable from each other spatially if necessary.
405:CAN user	CAN user does not respond.	• Check whether an error has occurred in the secondary CAN unit. Restart the secondary unit and main unit if necessary.
406:file def	Language file could not be loaded.	• Restart your Solar Inverter. Carry out a software update for the language file.
407:file def	Website could not be loaded.	• Restart your Solar Inverter. Install the latest file for the website via a software update.
408:file def	File with error messages could not be loaded.	• Restart your Solar Inverter. Install the latest file for the error messages via a software update.
409:CAN-ID	Two Solar Inverters were assigned the same ID.	• Select one of the two devices with identical CAN ID and set it to Single Unit mode, thereby deactivating the CAN ID. • Then set the device directly in to Secondary Unit mode and assign a new CAN ID.
Interface/communication warnings		
501:Solar (Warning)	No sensor found on sensor channel 1 (solar).	If a sensor is connected: • Check the sensor connection. If no sensor is connected: • Check the configuration via the Sunways Browser.
502:Temp. (Warning)	No sensor found on sensor channel 2 (Temperature).	If a sensor is connected: • Check the sensor connection. If no sensor is connected: • Check the configuration via the Sunways Browser.

Display message	Description	Cause and possible remedies
503:CAN com. (Warning)	Communication malfunctions occur repeatedly on the CAN bus.	A malfunction occurs in the data transmission on the CAN bus. However, a data exchange continues to be possible. • Check whether all bus line connectors and terminating resistors are mounted properly. • Check whether bus cables were installed parallel to power cables. Separate bus lines and power cable from each other spatially if necessary.
504:CAN cfg. (Warning)	CAN bus is in the configuration mode. No measured values are transferred.	At least one unit is in the menu item Settings – Network – CAN bus. • Close this menu in all units.
505:SMTP ser. (Warning)	SMTP server cannot be reached	An error occurred during e-mail delivery. Re-attempting e-mail delivery. • If the fault recurs check the e-mail settings via the Sunways Browser
506:SMTP soc. (Warning)	SMTP no socket available	
507:SMTP cm. (Warning)	SMTP faulty communication with server	
508:DNS fehl. (Warning)	DNS has failed	Communication fault between the integrated web server and an Internet browser in conjunction with the Sunways browser. These warnings are non-critical and can be ignored if they only occur occasionally. These warnings have no influence on the energy production of the inverter.
509:HTTP con. (Warning)	HTTP client connection has failed	
510:HTTP aut. (Warning)	HTTP client authorisation has failed	
511:HTTP tim. (Warning)	HTTP client timeout	
512:HTTP soc. (Warning)	HTTP client no socket available	
513:HTTP soc. (Warning)	HTTP client error with socket	
514:HTTP met. (Warning)	HTTP client incorrect method	
515:HTTP pro. (Warning)	HTTP client error with protocol	
516:HTTP wr. (Warning)	HTTP client write error	
517:HTTP re. (Warning)	HTTP client read error	
518:CAN init. (Warning)	CAN initialisation error	CAN bus initialisation fault during device startup. • Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.

Display message	Description	Cause and possible remedies
519:Time syn (Warning)	Time synchronisation with the NTP server has failed	• Firewall port 123 is blocked. • Select an alternative time server
Remote access warnings		
601:limit K2 (Warning)	The output power of your Solar Inverter is limited to the threshold for relay K2 stored in the Sunways Browser, as specified by your power supply company.	• Contact your energy supplier regarding compensation depending on the duration of the problem.
602:limit K3 (Warning)	The output power of your Solar Inverter is limited to the threshold for relay K3 stored in the Sunways Browser, as specified by your power supply company.	Contact your energy supplier regarding compensation depending on the duration of the problem.
603:limit K4 (Warning)	The output power of your Solar Inverter is limited to the threshold for relay K4 stored in the Sunways Browser, as specified by your power supply company.	Contact your energy supplier regarding compensation depending on the duration of the problem.
Service fault		
9xx:Service	A service error has occurred.	• Disconnect the Solar Inverter from the grid and from the solar generator and reconnect it. If the error occurs again, please contact the Technical Hotline. The phone number is provided on the back of the manual.

6.2 System monitoring

General information

The basis for the system monitoring is the data logger integrated in the NT Solar Inverter. The Solar Inverters of the NT series offer a wide range of monitoring options for your solar system:

- The Sunways browser can display instantaneous values, stored operating data and settings.
- With active alerting information about faults in the solar system can be sent to a selected recipient via e-mail.
- Via the Sunways Portal connection the NT Solar Inverter can send the operating data of your solar system to the Sunways Portal on a daily basis without additional hardware. In this way you can monitor your yields via the Internet from wherever you are.

Three networking options are available for access to the system monitoring function:

- Direct connection via an Ethernet cable (see section Direct Ethernet connection) or internal network (see section Connection via an existing Ethernet network)

NOTE
With a direct connection or an internal network without gateway to the Internet the Solar Inverter is unable to send e-mails. Portal connection and active alerting is therefore not possible.

- Connection via Internet, e.g. via a DSL connection for the Solar Inverter (see section Remote access via a DSL router)
- Connection via a Sunways modem (see section Connection via a Sunways modem)

Integrated data logger

The data logger integrated in the NT Solar Inverter stores the operating data of your solar system. In addition to 5-minute mean values, energy yields are also stored as 5-minute, daily, weekly, monthly and annual values. Up to 200 status changes (warnings and errors with start and end) are also stored. Each data record contains the data and time. The data logger is designed as a circulating memory, i.e. the respective oldest data are overwritten with new data.

Operating data (5-min. average values)

Number	Value
4500	DC current
4500	DC voltage
4500	AC current
4500	AC voltage
4500	AC output
4500	Unit temperature
4500	Module irradiance (opt.)
4500	Module temperature (opt.)

With this data memory volume approx. 30 days' worth of values can be stored before the first value in the ring buffer is overwritten again.

Energy Yields

Number	Value
4500	5-minute yield
7300	Daily yield
250	Monthly yield
20	Annual yield
1	Total yield since commissioning

Status messages

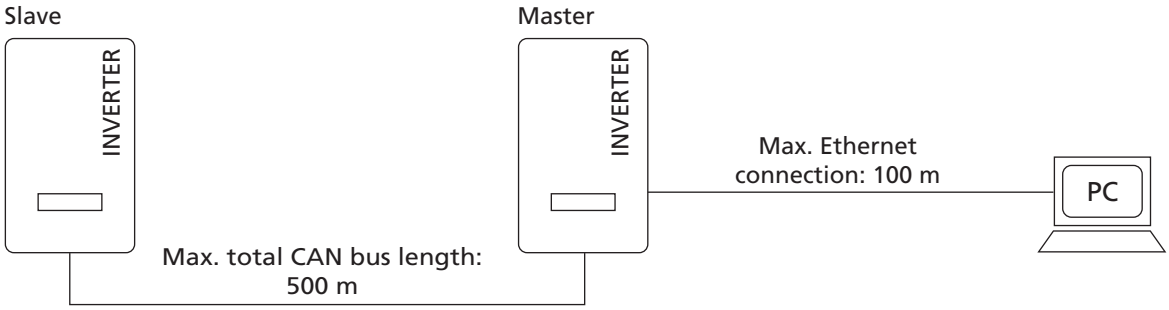
Number	Value
200	Status changes

Direct Ethernet connection

The Solar Inverters are equipped with an Ethernet interface as standard for system monitoring and configuration with a PC.

Connect your PC and the Solar Inverter using the Ethernet cable provided. X-patch cables can also be used.

The PC is connected to the main unit as standard. Basically all Solar Inverters – including Solar Inverters configured as secondary units or single units – feature their own web server, so that a connection with any device can be established.



NOTE

- To always find the suitable configuration for installation and commissioning on the PC, we recommend the use of a second network card (e.g. PCI Bus, PCMCIA), which you can configure to match the default setting of the Solar Inverter.
- The PC and the Solar Inverter must have matching IP addresses and net masks. The network settings can be adjusted either directly on the Solar Inverter via the LCD display or on your PC.
- If two network cards are used the IP addresses must be in separate subnets, e.g. 192.168.30.XXX and 192.168.40.XXX.

Network settings on the Solar Inverter

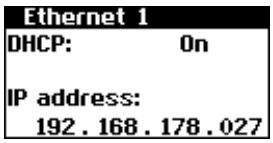
NOTE

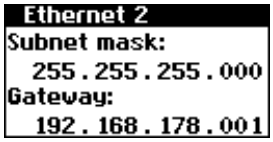
- The Solar Inverter is supplied with the following preset IP address: **192.168.30.50**
- In the default setting the Solar Inverter does not support DHCP (Dynamic Host Configuration Protocol). Therefore, the IP address is not assigned automatically. It is possible to activate the DHCP protocol via the Settings menu.
- IP addresses may not be assigned twice within the network!

If required you can assign your own IP address for the Solar Inverter via the Settings menu.

1. Open the menu Settings – Login.
2. Enter the default password (********, i.e. 8 asterisks) or the password you have assigned.

NOTE
Please note:
Only digits between 0 – 9 and letters between a – z and A – Z are permitted. The password always has 8 characters. If the password you entered has less than 8 characters, the remaining characters are filled with *.
Example:
Your password is "Solar". This password has 5 characters. The system automatically appends three *, so that the password becomes "Solar***".





3. Open the menu Settings – Network – Ethernet.
4. Enter an IP address suitable for use with your PC. This means the first three number blocks must be identical, and the last number block different.

   Example:

   If your PC has the IP address 192.168.1.1, assign the IP address 192.168.1.2 to the Solar Inverter
5. Call up additional settings with .
6. Enter the subnet mask **255.255.255.0** here.
7. Enter the IP address of your PC in the gateway.
8. Confirm with ok .

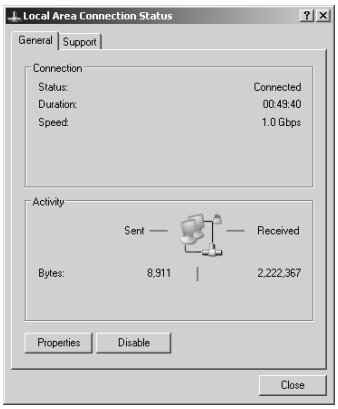
After the network configuration is completed you can start the Sunways Browser by entering the IP address of the Solar Inverter in the address line of your web browser.

Network settings on PC

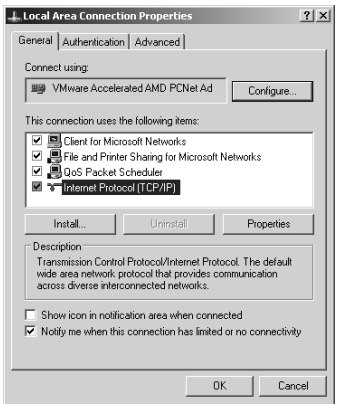
To enable your PC to communicate with the Solar Inverter, you must assign network settings. The procedure differs slightly depending on the operating system. An configuration example under Windows®XP is shown below.

NOTE
IP addresses may not be assigned twice within the network!

1. Select Start - Settings.
2. Select Network Connections.



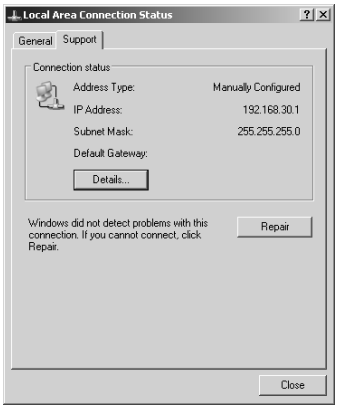
3. Double-click on the LAN connection via which you are connected to the Solar Inverter.
4. Click in the Status window on Properties.



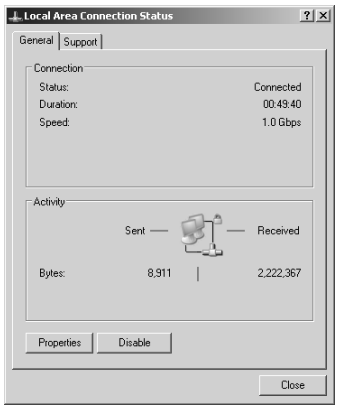
5. Mark Internet Protocol (TCP/IP) and click on Properties again.

Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 30 . 1
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

6. Now assign an unused IP address **192.168.30.XXX** and enter the subnet mask **255.255.255.0**.
7. Click on OK to confirm your entries.



8. In the Status menu item you can check the correctness of your entries and the status of your connection.



After the network configuration is completed you can start the Sunways Browser by entering the IP address of the Solar Inverter in the address line of your web browser.

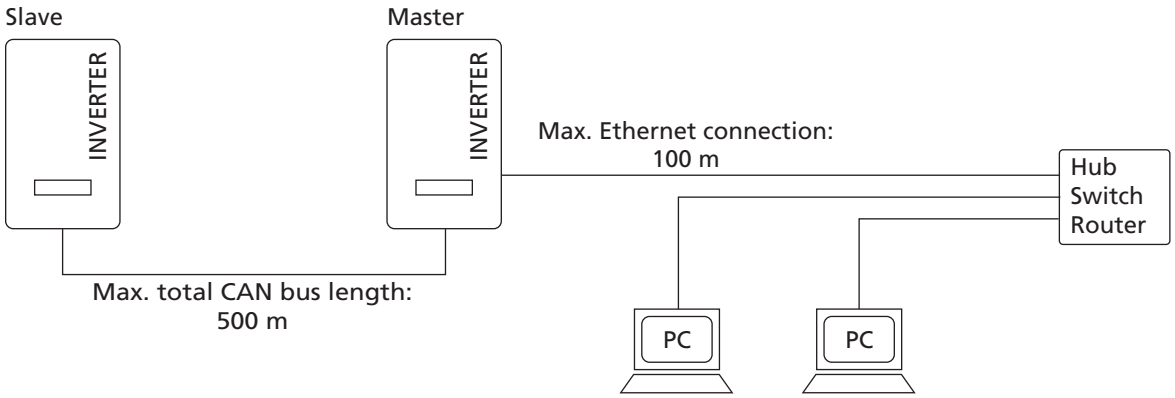
For more complex network configurations please contact your network administrator.

Connection via an existing Ethernet network

You can integrate the NT Solar Inverter as a network device directly in an existing home or company network.

Connect your PC and the Solar Inverter using a CAT 5 Ethernet patch cable.

The main unit is connected to the network as standard.



With DHCP

If a DHCP server is present in your network, you can activate DHCP on the Solar Inverter. In this case the Solar Inverter obtains the network settings automatically. You can display the assigned IP address via the LCD display (menu Settings – Network – Ethernet).

Without DHCP

If there is no DHCP server in your network, you must set an unused IP address on the NT Solar Inverter (see section Solar inverter network setting settings).

Ask your network administrator for the necessary settings for IP address, net mask and gateway.

After the network configuration is completed you can start the Sunways Browser by entering the IP address of the Solar Inverter in the address line of your web browser.

Remote access via a DSL router

If a DSL connection or a network with Internet access is available you can make the Solar Inverter accessible via the Internet.

Requirements:

- Your DSL router supports static IP address services such as www.dyndns.org

- Your router supports port forwarding.

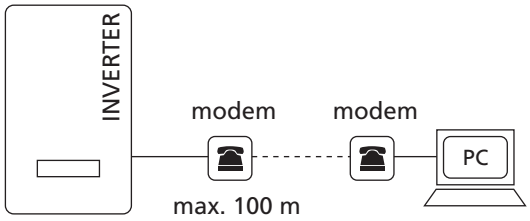
Procedure:

1. Connect your Solar Inverter with your DSL router. Use a CAT5 Ethernet cable with 1:1 RJ45 sockets. The main unit is connected to the network as standard.
2. Register free of charge, e.g. at www.dyndns.org.
3. Create an alias for accessing your Solar Inverter, e.g. NT-sunways.dyndns.org. You can then access your Solar Inverter via this address.
4. Configure your DSL router such that the IP address is regularly reported to www.dyndns.org (follow the procedure described in the manual for your DSL router for this purpose).
5. Configure your DSL router such that it accepts queries from the Internet (e.g. via port 80) and forwards them internally to the Solar Inverter (port forwarding).
6. Also note that the port for access from the Internet set in your firewall must be enabled.

NOTE
Instructions for configuring common DSL routers are available for download from the Sunways AG website.

Connection via the Sunways Modem

A modem connection can be used to bridge longer distances during system monitoring and configuration. The Sunways Modem is connected to the Solar Inverter for this purpose. The Sunways Modem is available as an analog, ISDN and GSM type.



1. Connect your Solar Inverter and your PC with a crossed or 1:1 Ethernet connection cable, type CAT5 with RJ45 sockets.

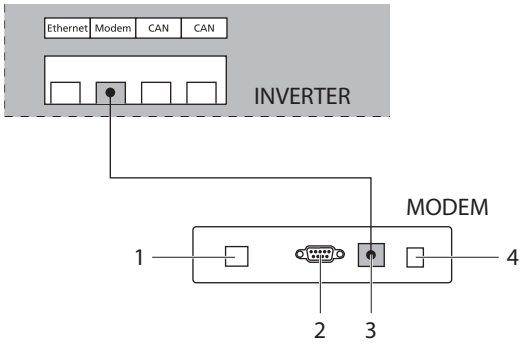
NOTE
In a networked system only the main unit should be connected to the remote modem as standard.

2. Connect an external modem to your PC or use the internal modem of the PC, if available. For commissioning please refer to the Sunways Modem user manual.

NOTE
The following modem combinations are permitted:

ISDN – ISDN
analog – analog
analog – GSM
GSM – analog
GSM – GSM

Connecting a Sunways Modem



1 Telephone connection
2 RS232 interface
3 LVDS for NT, AT and PT Solar Inverters
4 Power supply unit

Dial-up connection from a PC to the Solar Inverter

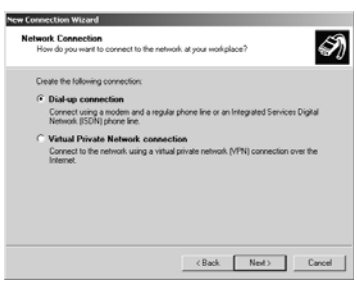
To establish a connection to your Solar Inverter with a PC via the modem, you must establish a dial-up connection in Windows. The procedure under Windows®XP is shown below.

1. Run the wizard for a new connection via Start – Settings – Network Connections.

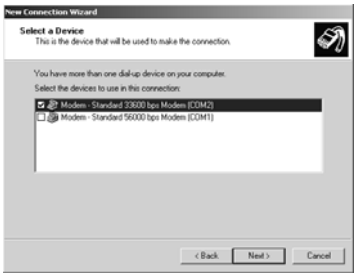
   The first selection screen is opened with Continue.

New Connection Wizard
Network Connection Type
What do you want to do?
Connect to the Internet
Connect to the Internet so you can browse the Web and read email.
Connect to the network at my workplace
Connect to a business network (using dial-up or VPN) so you can work from home, a field office, or another location.
Set up a home or small office network
Connect to an existing home or small office network or set up a new one.
Set up an advanced connection
Connect directly to another computer using your serial, parallel, or infrared port, or set up this computer so that other computers can connect to it.
< Back
Next >
Cancel

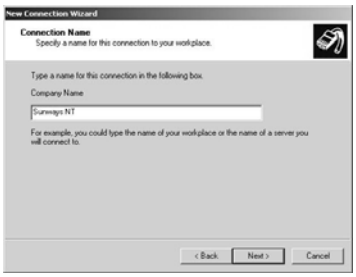
2. Select Connection to the network on My Computer.


New Connection Wizard
Network Connection
How do you want to connect to the network at your workplace?
Create the following connection:
Dial-up connection
Connect using a modem and a regular phone line or an Integrated Services Digital Network (ISDN) phone line.
Virtual Private Network connection
Connect to the network using a virtual private network (VPN) connection over the Internet.
< Back
Next >
Cancel

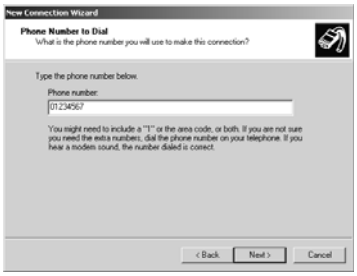
3. Click Continue, select Dial-up connection in the next screen, and click Continue.


New Connection Wizard
Select a Device
This is the device that will be used to make the connection.
You have more than one dial-up device on your computer.
Select the devices to use in this connection:
Modem - Standard 33600 bps Modem (COM2)
Modem - Standard 56000 bps Modem (COM1)
< Back
Next >
Cancel

4. A list of the installed modems appears. Select the required modem and click Continue.


New Connection Wizard
Connection Name
Specify a name for this connection to your workplace.
Type a name for this connection in the following box.
Company Name
Sunways NT
For example, you could type the name of your workplace or the name of a server you will connect to.
< Back
Next >
Cancel

5. Enter a connection name and confirm your entry with Continue.


New Connection Wizard
Phone Number to Dial
What is the phone number you will use to make this connection?
Type the phone number below.
Phone number:
01234567
You might need to include a "1" or the area code, or both. If you are not sure you need the extra numbers, dial the phone number on your telephone. If you hear a modem sound, the number dialed is correct.
< Back
Next >
Cancel

6. Specify the phone number of your Sunways Solar Inverter.

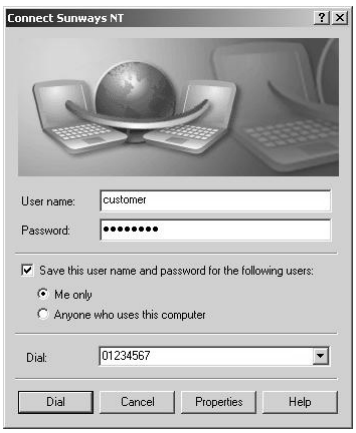
   When entering the telephone number, you may need to include one or more digits to connect to an outside line. (An outside line is usually obtained by placing a "0" before the actual telephone number.)

   Confirm your entry with Continue.

7. In the next screen you can specify whether or not this connection is to be available to all users of this PC. If in doubt specify "All users" and click Continue.

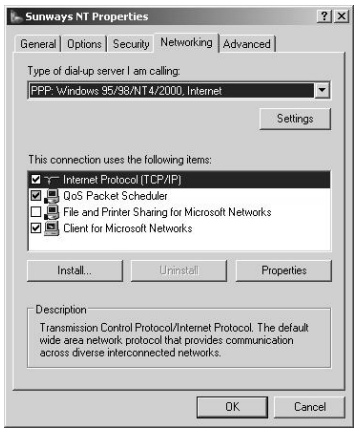
New Connection Wizard
Completing the New Connection Wizard
You have successfully completed the steps needed to create the following connection:
Sunways NT
• Share with all users of this computer
The connection will be saved in the Network Connections folder.
Add a shortcut to this connection to my desktop
To create the connection and close this wizard, click Finish.
< Back
Finish
Cancel

8. Click the checkbox to place a shortcut on your desktop and click Finish.



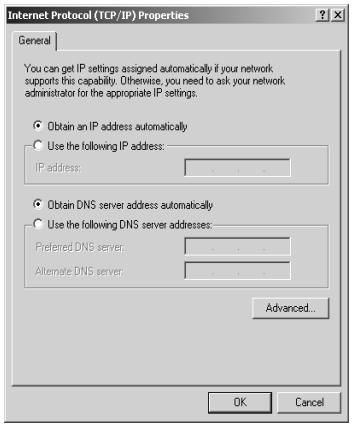
9. The connection window appears automatically after finishing the connection. (Alternatively via the icon on your desktop or via Start – Settings – Network Connections.)

   Further settings are required in the Properties section.



10. First select the Network tab and mark the entry Internet Protocol (TCP/IP) there.

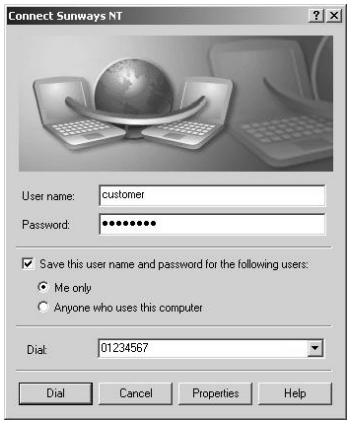
    Select Properties.


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

11. Enter the following data:

    Obtain an IP address automatically

    Obtain DNS server address automatically



12. Enter "customer" as the user name and the standard password (********, i.e. 8 asterisks) or the password you entered previously.

NOTE
The password matches the customer password on the unit.

13. The connection is established with Dial. After the connection is established you can start the Sunways Browser by entering the IP address of the Solar Inverter in the address line of your web browser.

NOTE
In contrast to the normal IP address for a modem connection the IP address of the Solar Inverter is set to **192.168.20.50** by default.

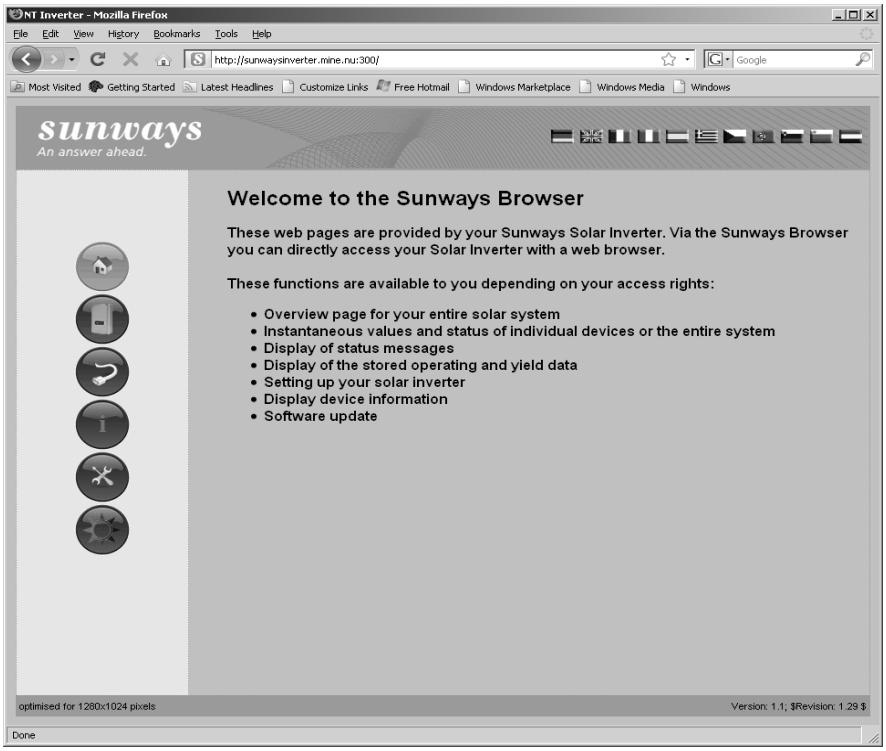
6.3 Sunways Browser

General information

The Sunways Browser can be run via a standard Internet browser, e.g. Mozilla Firefox. One of the three possible connections between a PC and the Solar Inverter is required for this purpose (see section 6 System monitoring).

NOTE
Your browser must be set to UTF-8 character coding in order to ensure that all characters are displayed correctly.

The start screen opens once the IP address of the Solar Inverter has been entered in the address line of the browser:


NT Inverter - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://sunwaysinverter.mine.nu:300/
Most Visited Getting Started Latest Headlines Customize Links Free Hotmail Windows Marketplace Windows Media Windows
sunways
An answer ahead.
Welcome to the Sunways Browser
These web pages are provided by your Sunways Solar Inverter. Via the Sunways Browser you can directly access your Solar Inverter with a web browser.
These functions are available to you depending on your access rights:
Overview page for your entire solar system
Instantaneous values and status of individual devices or the entire system
Display of status messages
Display of the stored operating and yield data
Setting up your solar inverter
Display device information
Software update
optimised for 1280x1024 pixels
Version: 1.1; $Revision: 1.29 $
Done

Here you can select from eleven different languages.

The browser offers the following functions:

- Display of the operating mode and instantaneous values for a single unit or for a CAN-networked system
- Display of energy yields as 5-minute, daily, monthly, annual and total values
- 5-minute mean values of solar generator current and voltage, grid current and voltage and feed-in power
- Settings, e.g. of date/time, interface configuration, alerting options, communication parameters etc.
- Communication software update (LCD display, interfaces, communication and Sunways browser) and the control software (control and monitoring)

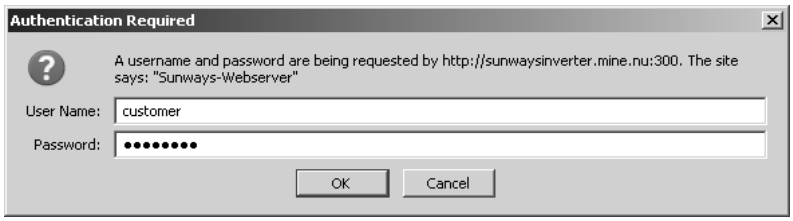
Access protection

The Sunways Browser is provided with password protection so that unauthorised persons cannot access your Solar Inverter.

The following user data are set in the delivered state:

User: customer

Password: ******



NOTE

- It is recommended that you change this password to an 8-character/digit password.
- This password is identical to the password entered via the LCD display for settings and commissioning.
- Only digits between 0 – 9 and letters between a – z and A – Z are permitted.
- The password always has 8 characters. If the password you entered has less than 8 characters, the remaining characters are filled with *.
- Example:

  Your password is "Solar". This password has 5 characters. The system automatically appends three *, so that the password becomes "Solar***".
- If you cannot remember the password you can request a device-specific password from the Technical Hotline (Tel. 49 (0)7531 996 77-577) so that you can access your Solar Inverter again. In this case you need the serial number and the MAC address, which can be found on the type label.

Overview – Menu

Home – Display of start page

Solar Inverter – Display of the instantaneous values, the stored operating data, and the status of the Solar Inverter

Solar System – Displays a system overview with status, total output, yields and access to secondary units (only available if the unit is connected with the main unit)

Information – Device information, e.g. serial number

Settings and software update for the unit or the networked system

System information for your solar system such as name, capacity, geographical location, a photograph and details of the components.

Language selection

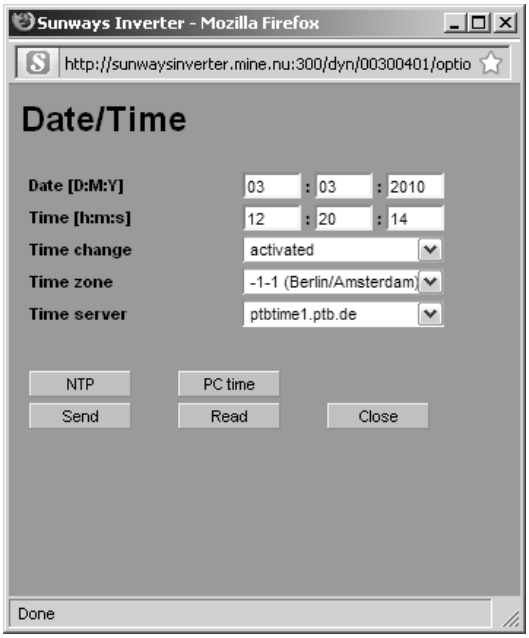
You can display the web pages in the following eleven languages. Click on the country flags to switch to the respective language.

- English
- English
- Spanish
- Italian
- French
- Greek
- Czech
- Slovenian
- Portuguese
- Dutch
- Bulgarian

Setting date/time

This function can be accessed via Settings – Date/Time. If you have selected the correct time zone and an Internet connection is available, you can automatically synchronise the time of the Solar Inverter with a time server with the NTP button.

As an alternative you can also transmit the PC time to the Solar Inverter.



NOTE
Please note that time settings should only be made with caution, as they directly affect data logging. For example, if you set the time back by 1 hour, then the existing data will be overwritten.

Software update

The software update is used to expand functions on your Solar Inverter. The communication software (responsible for LCD display, interfaces, communication and Sunways Browser) and the control software or the monitoring software can be updated.

1. Call up the function Settings – Software Update for this purpose. This function requires entry of a password (default: ******** = 8 asterisks or the your own customer password).
2. The upper screen section shows the current software versions. If a new version is made available on our website (http://www.sunways.eu/en) you can download this file and load it via the Sunways Browser. Select the file on your hard disk in the File field with the Browse… button and confirm the file dialogue with OK.
3. Select a software package.
4. The current software is copied to the Solar Inverter with the Update button.
5. Use the COM Reset button to restart the communication unit and load the new software.

Devices networked via CAN can be updated via the network. In this case the software is distributed to the secondary units via the main unit. Please contact our Technical Hotline for further information. The phone number is provided on the back of the manual.

During the update process, update information is displayed in the status indicator in the standard window of the Solar Inverter's LCD display. The display messages have the following meaning:

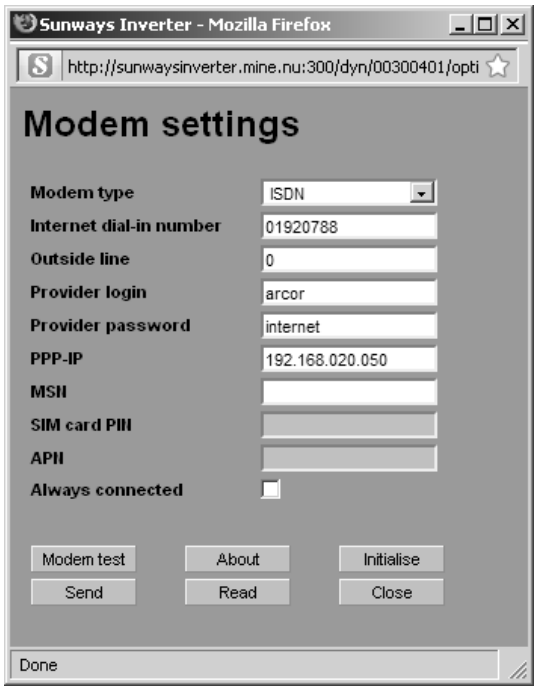
Display text	Update type
Reg.Upd.	Control software

Display text	Update type
Ueb.Upd.	Monitoring software
Com Upd.	Communication software
Wif Upd.	Web interface
DWifUpd.	Dynamic web interface
MenSUpd.	Menu structure
MenFUpd.	Menu error texts
WifSUpd.	Web interface status texts
RWP.Upd.	Read/write parameters
ROP.Upd.	Read only parameters
ParaUpd.	Parameter update
Min Upd.	Update of the minute values in the data logger files
Day Upd.	Update of the daily values in the data logger files
Mon Upd.	Update of the monthly values in the data logger files
YearUpd.	Update of the annual values in the data logger files
SMinUpd.	Update of the minute values in the system data logger files
SDayUpd.	Update of the daily values in the system data logger files
SMonUpd.	Update of the monthly values in the system data logger files
SYerUpd.	Update of the annual values in the system data logger files

Internet dial-in via modem

Modem settings

If you use a modem for the Internet connection, the modem must be set up accordingly via the Sunways Browser. Therefore, first establish a connection between your PC and the Solar Inverter (see section Direct Ethernet connection). With the web browser you can then make the following settings in the menu Settings– Modem:



Modem type — Selection for the modem type: Analogue, ISDN or GSM modem

Internet dial-in number — Dial-in number of your Internet provider (ISP)

Outside line — If you have a telephone system, you can, for example, enter a 0 here. A comma results in a dialling pause of 1 second.

Provider Login — User name defined by your Internet provider

Provider password — Password defined by your Internet provider

PPP-IP — You can reach the Solar Inverter by entering this IP address in your web browser. The default address is **192.168.20.50**.

MSN — With an ISDN modem you store the MSN of the extension to which the modem is connected here. This is usually the telephone number of the extension without the area code.

SIM card PIN — With a GSM modem you enter the PIN of the SIM card here.

APN — Access point number. You can obtain the APN from your mobile communications provider.

Always connected — Select this option if you have a GPRS mobile tariff in order to ensure that the device is always online.

NOTE
Please note!!! With time-based tariffs (e.g. modem connection with GSM or analog) this function can result in very high phone charges!

Function buttons — Use the Send option to save the settings in the Solar Inverter.

Use Read to display the settings currently stored in the Solar Inverter.

With Modem Test you can test the modem connection to the set Internet provider. You will receive feedback as to whether dialling in was successful.

Click About to obtain additional information about the modem.

Click Initialise to re-initialise the modem.

NOTE

- Before conducting the modem test, the settings must be stored in the Solar Inverter with Send.
- For example, you can select inexpensive dial-in numbers for Internet providers at www.teltarif.de/internet or www.billiger-surfen.de. Here you will find not only tariff information, but also the access data (phone number, user name, password).

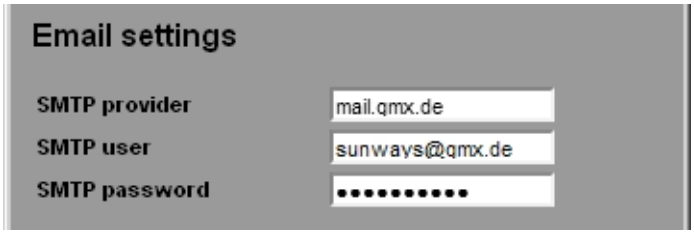
E-mail settings

In order for the Solar Inverter to be able to send e-mails, the e-mail settings must be stored via the Sunways Browser. The settings can be accessed via Settings – Network in section E-mail Settings.

NOTE

Requirements:

- When dialling in via modem, the correct dial-up settings must be stored (see Internet dial-up via modem).



SMTP provider

SMTP server for sending e-mails, e.g. mail.gmx.net (max. 30 characters). Alternatively an IP address can be entered.

SMTP user

User name for your e-mail provider (generally your e-mail address), e.g. sunways@gmx.de (max. 50 characters)

SMTP password

Password for your e-mail provider (max. 20 characters)

Function buttons

Via SMTP Test you can send a test message to the e-mail address stored for active alerting.

NOTE

- Before conducting the SMTP test, the settings must be stored in the Solar Inverter with Send.

- During the SMTP tests an e-mail is sent to the e-mail address stored in the system monitoring unit (active alerting). Before starting the test check whether a valid e-mail address is stored under active alerting.
- If no login is set up on the configured SMTP server, the password field must be left empty. The login field is entered as the sender address for the e-mail. If no login is specified, the Solar Inverter sends the e-mail as nt-inverter@sunways.de.

Use the Send option to save the settings in the Solar Inverter.

Use Read to display the settings currently stored in the Solar Inverter.

Active alerting

General information

With active alerting you can receive) status messages (errors and warnings) for your solar system by e-mail. If a status message was active for longer than 15 minutes or occurred 5 times in one day, you will receive an e-mail at the next full hour, which is sent to the e-mail address stored in the Solar Inverter.

NOTE
The main unit sends the status messages of all Solar Inverters if they are CAN-networked.

Requirements:

- The main unit must be connected to the Internet via a network or modem.
- When dialling in via modem, the correct dial-up settings must be stored (see Internet dial-up via modem).
- Correct e-mail settings must be stored in the Sunways Browser (see E-mail settings).

Alerting settings

The alerting settings can be accessed with the button Settings – System Monitoring in the Active Alerting section.

Active e-mail alerting Activation or deactivation of the active alerting function.

E-mail address In the E-mail address field you enter the e-mail address to which the messages are to be sent.

Function buttons Use the Send option to save the settings in the Solar Inverter.

Use Read to display the settings currently stored in the Solar Inverter.

Sunways portal connection

General information You can have the operating data of your solar system automatically sent to the Sunways Portal to monitor your system via the Internet. This is possible without using a Sunways Communicator.

The portal connection is configured via the Sunways Browser. Following activation the main unit automatically sends a registration e-mail containing the system data (e.g. number of units, serial number, etc.) to the Sunways Portal.

After activation the operating data for each day are sent to the Sunways Portal by e-mail on a daily basis before the main unit is switched off for the night. The interval can also be set shorter as an alternative. If a change is made to your solar system (e.g. additional unit), then the change is automatically reported to the Sunways Portal.

A basis access for the Sunways Portal for displaying the yield data is available to every Sunways customer free of charge. Expanded functions, e.g. the set-point-actual comparison in the Sunways Portal, can also be purchased for a fee.

NOTE
The main unit sends the status messages of all Solar Inverters if they are CAN-networked.

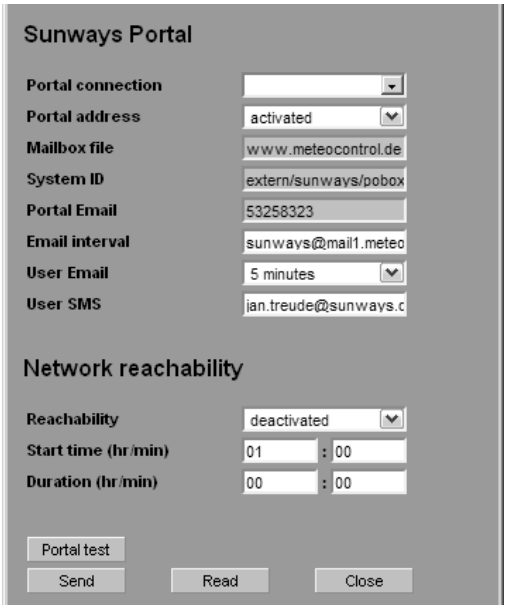
Requirements:

- The main unit must be connected to the Internet via a network or modem.
- Correct e-mail settings must be stored in the Sunways Browser (see E-mail settings)
- Correct portal settings must be stored in the Sunways Browser.

Setup

Check whether you meet all requirements. Configure the specified settings if necessary.

Open the setting page in the Sunways Browser. This can be accessed under Settings – System Monitoring in the section Sunways Portal.



Portal connection

Activation or deactivation of the portal connection.

Portal address

Preset for the Sunways Portal

Mailbox file

Preset for the Sunways Portal

System ID

System ID assigned by the portal. This is generated automatically after portal activation and sent to the Solar Inverter. It can take up to 4 minutes before the Solar Inverter displays the system ID.

Portal E-mail

Preset for the Sunways Portal. Here as well, you can enter another address if you want to evaluate the operating data yourself.

E-mail interval

Select the interval at which the e-mails are to be sent. If you operate the system on a DSL modem, you can set a short interval. If you use a modem connection, select a longer interval (e.g. daily) to eliminate unnecessary phone charges).

User E-mail

Enter an e-mail address in this field, to which the confirmation message will be sent by the Portal. It contains a link for the activation of your system in the Sunways Portal.

User SMS

As an option you can specify a mobile number to which a text message is sent once your system is successfully set up in the Portal.

Function buttons

Use Portal Test to test the portal connection. You will receive an e-mail at the address specified under User E-mail and text message if you have entered your mobile phone number in under User SMS.

NOTE
Before the portal test you must transfer the settings to your Solar Inverter with Send. In addition, an SMTP server must be configured. These settings can be changed under Networking. If the test was successful, a an e-mail is sent to the user e-mail address or a text message to the specified phone number.

Use the Send option to save the settings in the Solar Inverter.

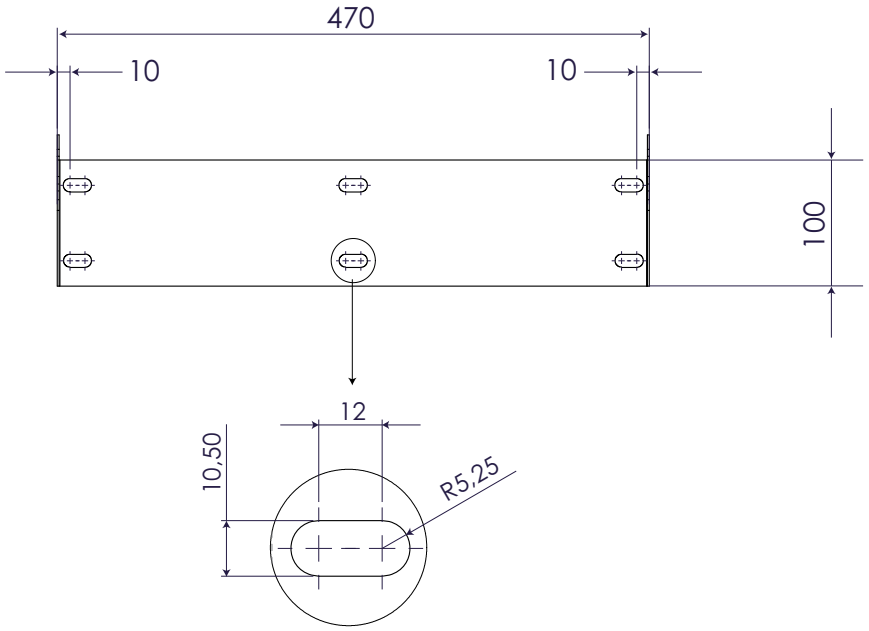
To view your system data in the Sunways Portal you need a user account. This will be issued to you if you follow the link in the confirmation e-mail and fill out the registration form.

As an alternative you can also enter an existing user name with the correct password to assign the system to an existing user account.

A Appendix

A.1 Drilling template for the wall bracket

You can use the following template for installing the wall bracket. The template shows all distances and dimensions.



A.2 General liability disclaimer

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